BIOLOGICAL ABSTRACTS

A COMPREHENSIVE ABSTRACTING AND INDEXING JOURNAL
OF THE WORLD'S LITERATURE IN THEORETICAL
AND APPLIED BIOLOGY, EXCLUSIVE
OF CLINICAL MEDICINE

Volume 13
1939

Published (beginning with the literature of 1926) under the Auspices of the
UNION OF AMERICAN BIOLOGICAL SOCIETIES
With the Cooperation of Biologists Generally

Editorial and Executive Offices: University of Pennsylvania
Philadelphia, Pennsylvania, U. S. A.

TABLE OF CONTENTS

TABLE OF CONTENTS FOR SECTION SUBSCRIBERS

Sectional subscribers will find this condensed table of contents useful in determining whether or not a given index number appears in their particular section.

ERRATA

Abstract No.	
1219	line 3: after *Carolina* insert *U. S. Dept. Agric. Bur. Chem. and Soils*
1386	lines 2 and 4: for *Cystostira* and *Cystosera* read *Cystoseira*
3189	line 5: for *Gnorischema* read *Gnorimoschema*
6420	*should be in the section "Mollusca"*
6431	line 7: for *Euodia* read *Evodia*
6629	*should be in the subsection "Virus Diseases"*
6828	line 5: for *Psamosolen* read *Psammosolen*
6833	*should be in section "Crustacea"*
6968	line 6: for *Atpopochilus* read *Atopochilus*
7035	line 3: for *Glaudicium* read *Glaucidium*
8248	line 1: for *Haul-* read *Haut-*
8715	line 23: *for* Peridinieae *read* Peridinidae
8760	line 4: for *Illyrionthes* read *Illyrionethes*
10121	line 10: for *Calyprocalyx* read *Calyptrocalyx*
10172	line 5: for *Hedalgo* read *Hidalgoa*
10451	line 12: for *Trioys* read *Trioxys*
10556	*this abstract belongs in section "Mollusca"*
10695	line 17: *for* Antiochus VI *read* Simon Maccabaeus
10714	line 5: for *Paphiodalum* read *Paphiopedilum*
12190	line 1: for *Horcius* read *Horcias*
12316	line 19: for *Salassiella* read *Salasiella*
12377	line 4: for *Phantoma* read *Phatnoma*
13739	line 1: for *Hydrotheria* read *Hydrothyria*
14116	line 1: for *Gasterocereodes* read *Gasterocercodes*
14225	line 5: for *Nidorella* read *Nidorellia*
15937	line 9: for *Achoria* read *Achroia*
15943	line 11: for *Asmaea* read *Aomaea*
17486	line 3: for *Daedalla* read *Daedalea*

BIOLOGICAL ABSTRACTS

VOL. 13, NO. 11, 1939.

Publication Office: 1500 Greenmount Ave., Baltimore, Md.
Executive and Editorial Office: University of Pennsylvania, Philadelphia, Pa., U.S.A.

The indexes to the present volume were prepared by Jean MacCreight, with the assistance of Sarah H. Stabler and Ruby M. Friedman.

CONTENTS FOR INDEX ISSUE, 1939

ABSTRACTS

INDEXES

Entered as 2nd class matter at the post office, Dec. 23, 1926, Baltimore, Maryland, under Act of Aug. 24, 1912. Published monthly during the months January to May, inclusive; bi-monthly, June to September, inclusive; monthly, October and November; semi-monthly in December.

Subscription $25 per volume domestic and foreign, postpaid. Checks should be made payable to BIOLOGICAL ABSTRACTS.

BIOLOGICAL ABSTRACTS

Editor-in-Chief, JOHN E. FLYNN; Assistant Editor, JEAN MACCREIGHT

VOLUME 13 DECEMBER, 1939 NUMBER 11

Entries 18056-18108

AVES

W. L. MCATEE, *Editor*, General Ornithology

18056. **BAUMGARTNER, FREDERICK M. Territory and population in the great horned owl.** *Auk* **56**(3): 274-282. 1939.—Field observations on the great horned owl, *Bubo virginianus*, at Lawrence, Kansas, and Ithaca, New York, demonstrated that the ♂♂ maintain a definite territory throughout the nesting season. This range is seldom more than ¼ mile in diam. and serves as the area in which both birds hunt for food. Resident owls are found near the nest site at all seasons of the year with the possible exception of a few months in the late summer and fall. Normally no other large species of owls are found within this territory. In optimum range the territorial requirements of the ♂♂ limit the density of population to 1-3 pairs to the sq. mile. The limited range of the species throughout most of the year has an important bearing upon its economic status.—*F. M. Baumgartner.*

18057. **BORIES, P. Un jeune Martinet.** *Oiseau* **9**(1): 144-145. 1939.—A young Martin, accidentally fallen from its nest, refused to take food at first, and had to be force-fed. Later, it opened its bill for food. It was not afraid of men or dogs. The bird began to fly 12 days after being found.—*D. S. Lehrman.*

18058. **CHAPIN, JAMES P. The birds of the Belgian Congo. II.** *Bull. Amer. Mus. Nat. Hist.* **75**(2): 1-632. 21 pl. (3 col.), 38 fig. 1939.—The present volume includes the families Rallidae to Picidae. For each species synonymy, description, and distribution are given. Keys to the larger genera are provided.

18059. **DEVITT, OTTO E. The Yellow Rail breeding in Ontario.** *Auk* **56**(3): 238-243. 1 pl. 1939.—The Yellow Rail (*Coturnicops noveboracensis*) was found widely distributed throughout the province of Ontario, occurring in suitable marshes from Lake St. Clair on the south to James Bay. While heard occasionally during the daytime, it became much more active just after sunset. The "voice" period extended at least from May 25 to July 27. A nest containing 7 eggs was found at Holland River Marsh, Simcoe County, on June 12, 1938, and is the first reported from Canada.—*O. E. Devitt.*

18060. **FLEMING, C. A. Birds of Chatham Islands. 3. The shore plover.** *Emu* **39**(1): 1-15. 6 pl. (1 col.) 1939.—*Thinornis novae-seelandiae* has been recorded from many localities throughout the main islands of New Zealand, although never in large numbers; in 1888 apparently its extinction on the mainland had already begun, and in no subsequent writing is there an account of its occurrence. So complete and so early was this extinction brought about that it is difficult if not impossible to locate, in New Zealand collections, specimens from mainland localities. In view of the large number of shore plover on South East Island it is surprising that no colonization of the nearby parts of Pitt Island has occurred. At present the shore plover may be considered as being confined to South East Island. The courtship habits of the species follow the pattern of behavior common to many waders; a few of these traits are descr. All but one of the 17 nests examined were in some way sheltered from above and entered from the sides, and contained 2 or 3 eggs. General observations, sexual differences in plumage, construction of nest, coloration of eggs, young, and ecological factors descr.—*P. A. Gilbert.*

18061. **FRIEDMANN, H., and H. G. DEIGNAN. Notes on some Asiatic owls of the genus Otus, with description of a new form.** *Jour. Washington Acad. Sci.* **29**(7): 287-291. 1939.—*O. senegalensis* **distans,** from northern Siam, related to African *O. senegalensis;* critical discussion of Asiatic forms of *O. scops, O. spilocephalus,* and *O. bakkamoena.*—*H. Friedmann.*

18062. **GILBERT, P. A. The bower-painting habit of the satin bower-bird, Ptilonorhynchus violaceus.** *Emu* **39**(1): 18-22. 2 pl. 1939.—The remarkable habit of painting the sticks of the bower with fruit pulp is descr. Two fruits are specially used, the blueberry and *Dianella* berry. The methods adopted by the ♂ satin bower-bird in applying fruit pulp to the walls of its bower indicate deliberation. An immature ♂ and a ♀ also were observed to paint.—*P. A. Gilbert.*

18063. **GROMIER, E. Quelques observations ornithologiques.** *Oiseau* **9**(1): 142-143. 1 fig. 1939.—Note of the finding of a nest of the yellow bunting (*Embenza citrinella*), made of paper.—*D. S. Lehrman.*

18064. **HALLER, L. Beobachtungen an der Tihanyer Kolonie des Fischreihers (Ardea c. cinerea L.).** *Arb. Ungarisch. Biol. Forschungsinst.* **10**: 45-51. 1938.

18065. **HELLMAYR, CHARLES E. Catalogue of birds of the Americas and the adjacent islands. XI. Ploceidae-Catamblyrhynchidae-Fringillidae.** *Field Mus. Nat. Hist. Publ.* 430. **13**(6): 1-662. 1938.—This catalog of the family of the finches concludes the treatment of the American Passeriformes in the Field Museum series. Scientific and common names, synonymy, bibliographic references, geographic ranges, and localities of the specimens in the Field Museum are given for spp. and sspp. recognized by the author, with taxonomic descriptions in some cases. 110 genera are listed. Index. Fringillidae: *Sporophila nigricollis* vivida nom. nov. p.209.—*S. H. S.*

18066. **HINDWOOD, K. A. Nectar-feeding birds near Sydney.** *Emu* **39**(1): 40-44. 1 pl. 1939.—An annotated list of birds, chiefly honeyeaters and parrots, mostly observed feeding on the blossoms of the genus *Eucalyptus.*—*P. A. Gilbert.*

18067. **HOMONNAY, N. Die Vögel der Halbinsel Tihany, unter besonderer Berücksichtigung der sich durch den natürlichen Aufbau der Halbinsel ergebenden Lebensräume der Vögel.** *Arb. Ungarisch. Biol. Forschungsinst.* **10**: 52-83. 1938.—On the basis of the breeding and feeding places of the birds, the Tihany peninsula is divided into 12 so-called bird-biochors. Each of these is composed of the various biotops of the birds. The breeding places of the various species are called their primary biotops, whereas the feeding places are the secondary ones. Each species may have several primary and secondary biotops of different importance and they may even occupy different biochors. The number of bird species observed in the peninsula was 168, of which 56 were observed breeding there.—*A. Wolsky.*

18068. **HURSTHOUSE, E. W. Some observations on the breeding habits of the little penguin.** *Emu* **39**(1): 15-17. 1939.—The period of incubation was 38 days, shared by both parents. Young, methods of feeding, molt, and other aspects are dealt with, followed by a brief summary of dates and events.—*P. A. Gilbert.*

18069. **KLEINER, A. On the importance of biotops in the bird-migration. (Observations at the waters of Trans-**

danubia, Hungary.) *Arb. Ungarisch. Biol. Forschungsinst.* **10**: 84-92. 1938.—Most of the water-birds insist on certain biotops, even in migration. Thus water-birds and shore-birds seem to migrate along rivers, as has been observed regularly in Gönyű on the Danube and occasionally in Szentendre, Budapest and Ercsi, also on the same river. Thus the river seems to constitute a directive path of bird-migration.—*A. Wolsky.*

18070. **LACK, DAVID. The behaviour of the robin.** *Proc. Zool. Soc. London* Ser. A. 109(3): 169-219. 1939.—The elicitation of aggressive behavior in the robin is correlated with at least 4 elements in the external situation (flying-away movement, robin-shape, red breast, song), each of which tends to be associated, but not exclusively, with a particular motor behavior (pursuit-flight, striking, posturing, song). The internal state promoting aggressive behavior also seems complex.—*W. E. Collinge.*

18071. **LEWIS, F. The breeding habits of the lowan in Victoria.** *Emu* 39(1): 56-62. 1939.—A careful study of the lowan or mallee fowl, *Leipoa ocellata,* during recent years indicates that much of the usuallv-accepted doctrine regarding its nesting habits is faulty. The eggs when deposited in the mound always stand on the small end. Records of mound temps. and other data are valuable additions to our knowledge of the bird's life history.—*P. A. Gilbert.*

18072. **LINDSEY, ALTON A. Food of the starling in central New York State.** *Wilson Bull.* 51(3): 176-182. 1 fig. 1939.—Insects constituted 35% of the food in 661 adult (and independent young) starling stomachs, and 77% of that in 139 nestling stomachs. Vegetable matter makes up 41% in adults and 5% in nestlings, while mineral items are 0.8% and 2.2%, respectively. The remainder of the food in each case is animal matter other than insects, including millipedes, unidentified items, and animal garbage. The food habits are decidedly beneficial, especially those of nestlings.—*A. A. Lindsey.*

18073. **LOWE, PERCY R. On the systematic position of swifts (sub-order Cypseli) and humming birds (sub-order Trochili), with special reference to their relation to the order Passeriformes.** *Trans. Zool. Soc. London* 24(4): 307-348. 4 pl., 1 fig. 1939.—A series of valuable and informative notes in an attempt to once and for all establish the position held by the swifts and humming-birds in the class Aves.—*W. E. Collinge.*

18074. **MOREAU, R. E. Numerical data on African birds' behaviour at the nest: Hirundo s. smithii Leach, the wire-tailed swallow.** *Proc. Zool. Soc. London* Ser. A. 109 (2): 109-125. 1939.—The effect of rain on parent birds' activity is given. Heavy rain reduced feeding activity. Brooding of eggs and young was carried out by the ♀♀. Incubation period is 14 days; fledging 18-21.—*W. E. Collinge.*

18075. **NICE, MARGARET MORSE. Symposium on the individual vs. the species. 3. The Social Kumpan and the Song Sparrow.** *Auk* 56(3): 255-262. 1939.—Social reactions of *Melospiza melodia* are considered from the viewpoint of Konrad Lorenz' Kumpan theory. This bird reacts to its companions through suggestion or so-called imitation, responds to warning, and exhibits despotism which is held in check in the breeding season through the factor of territory.—*M. M. Nice.*

18076. **NOBLE, G. K. Symposium on the individual vs. the species. 4. The rôle of dominance in the social life of birds.** *Auk* 56(3): 263-273. 1939.—There are 2 sharply defined types of dominance in birds: social and sexual. Sexual dominance has the same function in fish and birds. It calls forth posturing or other sexual attitudes. Territory may be sharply divided into different categories. Sexual territory, which is so characteristic of most birds, is, however, found in most egg-laying and nest-building vertebrates. It arises from the sexual interest of the animal in an area suitable for nesting and it functions primarily to test sexual readiness of the opposite sex and to make possible the formation of sexual bonds. Sexual territory is not to be confused with a nesting territory, which has a different motivational basis, nor with an isolated retreat which is defended by many vertebrates against intruders at any season.—*G. K. Noble.*

18077. **NUBLING, E. The painting of the satin bower-bird's bower.** *Emu* 39(1): 22-31. 1939.—An exhaustive account giving details of individual bowers. The first detailed account of this extraordinary habit appeared in the *American Journal of Ophthalmology,* 8(2), February, 1925. The author modifies certain statements contained in that article.—*P. A. Gilbert.*

18078. **POLDERBOER, EMMETT B. The summer habits of the ruffed grouse in Iowa.** *Iowa Bird Life* 9(3): 38-41. 1 fig. 1939.—Largely devoted to a study of the type of cover used during the July and Aug. moulting season during which the birds are flightless.—*A. L. Pickens.*

18079. **ROSENE, WALTER Jr. A preliminary investigation of the food habits of the mourning dove in Alabama.** *U. S. Dept. Agric. Bur. Biol. Surv. Wildlife Res. and Manag. Leafl.* BS-133. 10p. 1939.—In the 287 mourning dove (*Zenaidura macroura*) stomachs examined, 149 spp. of vegetable food representing 41 plant families were identified, all but 3 families providing food in quantities sufficient to be recorded as one per cent or more of the bird's annual diet in Alabama. More than 99% of the food consisted of seeds. Animal food was insignificant and was probably taken accidentally. The grasses were the most important family as a source of food, the cultivated vars.—corn, wheat, and Johnson grass—ranking first as a group. The most important single native food was seeds of bull paspalum (*Paspalum boscianum*). Those of crowfoot grass (*Dactyloctenium aegyptium*) and crabgrass (*Digitaria sanguinalis*) also were important. Other seeds of importance in the diet were those of pokeweed (*Phytolacca americana*), chickweed (*Alsine media*), wild legumes (*Galactia* and *Strophostyles*), cowpeas (*Vigna sinensis*), lespedezas (*Lespedeza*), doveweeds (*Croton*), evening-primrose (*Raimannia laciniata*), and ragweeds (*Ambrosia*). A shortage of choice foods apparently occurred in April and May. Preferred feeding places were on bare ground in open situations. The birds were found to concentrate around an abundant food supply. Preferred drinking places were at "watering holes" that had gently sloping banks, devoid of vegetation.—*Auth. summ.*

18080. **SALGUES, R. Contributions nouvelles à la physiologie de la plume. G. La morphologie de la plume comme élément taxinomique.** *Oiseau* 9(1): 51-57. 1939.—(After Chandler, U. of Calif. Pub. in Zool., 13, no. 11: 243-446, 1916.) Feather structure is a valuable taxonomic character. Distribution of plumules is not of much value, due to its variation, and to the adaptive value of the plumules. The presence and form of the hyporachis is a very significant character. The quill is not a dependable character due to its adaptiveness. The barb is a valuable character. The morphology and arrangement of the distal barbules of the flight-feathers is the best taxonomic feather-character. Contour feathers and down-barbules are not good taxonomic characters, except that the length, dimensions, and shape of the base of some of the down-barbules have phylogenetic significance. No single character can suffice as a basis of taxonomy. Evidence from the feathers leads to the following conclusions: the Procellariiformes are closely related to the Ciconiiformes; *Plotus* and *Phalacrocorax* should be in separate families; the Phoenicopteri are intermediate between Ciconiae and Anseres; the Phaethontidae are closer to the Laridae than to the Steganopodes; the Alcidae are close to the Laridae, but show some similarity to the Colymbiformes; the Gruiformes (particularly Rallidae and Aramidae) are closer to Limicolae than to Ciconiiformes; *Eurypyga* and *Cariama* are probably aberrant Ardeae; *Cursorius* is nearer to Ardeae than to Limicolae; the Pteroclo-Columbae are closer to the gallinaceous birds than to the laro-limicolines; the Tinamidae are an offshoot of the Galliformes; the Cuculiformes do not differ from Coraciiformes sufficiently to form a separate order; the Trochilidae and Pici are closer to the Passeriformes than to the Coraciiformes; the Galbulidae are not descended from Pici. —*D. S. Lehrman.*

18081. **TICEHURST, CLAUD B. A systematic review of the genus Phylloscopus. (Willow-warblers or leaf-warblers.)** With preface by MARTIN A. C. HINTON. viii+193p. 8 maps, 2 col. pl. Printed by order of the trustees of the British Museum: London, 1938, Pr. 10s.—This monograph is based on the collections of the British and other museums numbering 5,000 specimens and on field

experience. *Phylloscopus* has its present headquarters in the mountain ranges from Kashmir to Ransu with outlying species in Western Asia, Europe, Indo-China, and the Sunda Islands. The author recognises 28 spp. and 53 subspp. Of these he gives a key and a systematic review and for each of them a detailed account including a terse description of the adult, molts and plumage, measurements, weights, wing formula, soft parts, breeding range, migration, winter range, comparisons with related forms in field and museum, and citations of pertinent literature. The author tends to reduce the number of genera by reducing to synonymy those founded on degrees of difference. He finds subspecies living side by side on the same ground. He notes parallel variations in allied species in comparable ranges. The book is a comprehensive, adequate, and well-considered monograph based on ample material and long experience in its analysis, with significant generalizations.—*C. A. Kofoid.*

18082. **WHITLOCK, F. L. Birds of the Bunbury district, western Australia.** *Emu* 39(1): 47-56. 1939.—An annotated list of birds based on observations over 10 yrs. or more.—*P. A. Gilbert.*

18083. **WRIGHT, EARL G. Marking birds by imping feathers.** *Jour. Wildlife Management* 3(3): 238-239. 1 fig. 1939.—Feathers of any color can be firmly attached to bases of natural feathers by splicing with metal reinforcement.—*W. L. McAtee.*

18084. **WYNNE-EDWARDS, V. C. Intermittent breeding of the Fulmar (Fulmarus glacialis (L.)) with some general observations on non-breeding in sea-birds.** *Proc. Zool. Soc. London* Ser. A. 109(2): 127-132. 1 pl. 1939.—There is a large non-breeding population of Fulmars and other Procellariiform birds, which suggests that they do not breed annually. In non-breeding Fulmars obtained in northern Labrador in July the length of the middle claws varied from 16 to 10.6 mm., due to wear. As pelagic birds can only wear down their claws when breeding, this observation strongly suggests a non-breeding population of mixed age-groups. Ovaries from 4 representative non-breeding ♀♀ were sectioned, and histological confirmation obtained of the relation of claw-length to age. Resorbed remnants of ovulated follicles prove that all these birds had bred in one or many previous years, and thus that their reproduction is intermittent. A case of follicular atresia accompanied by the extrusion of yolk into the stroma is figured. When breeding is inhibited in the Fulmar and certain other birds the annual (post-nuptial) moult occurs prematurely. A short discussion is given of other effects of inhibited breeding in marine birds.—*W. E. Collinge.*

MAMMALIA

Editor: GERRIT S. MILLER. Associate Editor: REMINGTON KELLOGG

18085. **ALLEN, GLOVER M. Dog skulls from Uyak Bay, Kodiak Island.** *Jour. Mammal.* 20(3): 336-340. 1939.—From an aboriginal site of 4 acres, covered by a deposit believed to date from about the beginning of the Christian era to about the time of Russian occupation (1783), some 30 crania and mandibles were recovered during the excavations under Dr. Ales Hrdlička, representing 2 distinct breeds of dogs, a larger about the size of the Eskimo dog of Greenland, but with a more pinched-in rostrum, and a much smaller breed about the size of a spaniel but differing from most smaller types of dogs in the flatter forehead and nearly complete lack of swellings due to sinusal inflation of the portion between postorbital processes and braincase. A few skulls probably represent mongrels of these two, with disharmonic proportions. Measurements of 29 skulls of this lot are given. —*G. M. Allen.*

18086. **BAILEY, VERNON. The solitary lives of two little pocket mice.** *Jour. Mammal.* 20(3): 325-328. 1939.—These smallest known pocket mice (*Perognathus pacificus*) are fairly abundant in the sandy shores and dunes near the ocean in San Diego Co., southern California, but have not been found in the heavy soils a little back from the beaches. A ♂ and ♀ were captured near Oceanside in 1931 and kept for study until they died of old age, the ♀ in 1935 and the ♂ in 1937. They were fully adult when captured and must have been at least 5 and 7 years old when they died. Their habits in the field and in captivity were mainly solitary as in most animals that store food, the ♀ being aggressively acquisitive, though both were gentle and friendly with people. Their food consisted of a great variety of seeds of native and cultivated plants of which the families Compositae, Leguminosae and Gramineae furnished the staples. They drank water irregularly but became very thirsty if without water or green food for a few days.—*V. Bailey.*

18087. **BEACH, FRANK A. Maternal behavior of the pouchless marsupial, Marmosa cinerea.** *Jour. Mammal.* 20 (3): 315-322. 3 fig. 1939.—A lactating opossum exhibited maternal reactions comparable to those of the parturient rat; she gathered available material to build a nest, and retrieved her scattered young by pushing them under her belly where they could seize the ventral hair and cling to the mammae. Her reactions to the newborn rats were indistinguishable from her responses to her own young; but the rats failed to seize her coat and consequently were not retrieved. Young rats left in the exptl. cage over night were found in her nest box the following morning.—*F. A. Beach.*

18088. **BENSON, SETH B., and RICHARD M. BOND. Notes on Sorex merriami Dobson.** *Jour. Mammal.* 20(3): 348-351. 1939.—This shrew occurs in California. It intergrades with *S. leucogenys*, thus reducing *leucogenys* to the rank of a subspecies of *S. merriami*.—*S. B. Benson.*

18089. **CARR, A. F. Jr. Notes on escape behavior in the Florida marsh rabbit.** *Jour. Mammal.* 20(3): 322-325. 1939. —Observations on some 200 chases of a small number of Florida marsh rabbits (*Sylvilagus palustris paludicola*) by hounds, in the same area near Newnan's Lake, Florida, in which Blair's 1936 study of the Florida marsh rabbit was made, show that (1) the pursued rabbits are unhurried, moving with a short hop, and often back-tracking or "freezing," allowing the hounds to overrun the trail; (2) what are believed to be single individuals with some regularity follow predictable courses leading to preselected refuges, but the routes taken are not invariable.—*T. H. Hubbell.*

18090. **COTTAM, CLARENCE, A. L. NELSON, and TALBOTT E. CLARKE. Notes on early winter food habits of the black bear in George Washington National Forest.** *Jour. Mammal.* 20(3): 310-314. 1939.—A discussion of early winter food habits of black bears in George Washington National Forest, Virginia and West Virginia, based on examination of the stomach contents of 25 animals. Acorns and fruits of *Vaccinium*, tupelo (*Nyssa sylvatica*), grape, chokeberry (*Aronia melanocarpa*) and greenbrier (*Smilax*) were found to be the chief items of food. During the early winter, only 3½% of the food consumed was of animal material. During years of acorn failure the bears are forced to feed on fruits to a much greater extent than usual.—*A. L. Nelson.*

18091. **DEARBORN, NED. Sections aid in identifying hair.** *Jour. Mammal.* 20(3): 346-348. 1939.—Cross sections of mammal guard hairs, made where the hairs are broadest, are frequently distinctive of a family, or even a genus. The medullary pattern and the maximum size of a guard hair are also more or less diagnostic, when taken in connection with cross sections. These features are useful in identifying small mammal hairs found in stomachs and excreta of predators.—*N. Dearborn.*

18092. **FOX, E. H. Some notes on rat control in the Mourilyan area.** *Queensland Soc. Sugar Cane Technol. Proc.* 8: 37-39. 1937.—Over 90% of the field rats in the Mourilyan area of Queensland belong to the species *Melomys littoralis.* —*Courtesy Exp. Sta. Rec.*

18093. **FRY, DONALD H. Jr. A winter influx of sea lions from Lower California.** *California Fish and Game* 25(3): 245-250. 3 fig. 1939.—Sea lions can be counted most easily and accurately during the breeding season (early summer); therefore all previous counts in California were made at that time. To check the possibility of a winter influx of sea

lions from Mexican waters, a count was made in early March, 1939. Approximately twice as many California sea lions (*Zalophus californianus*) were found as on summer counts.—*D. H. Fry, Jr.*

18094. **GAZIN, C. LEWIS. A further contribution to the Dragon Paleocene fauna of central Utah.** *Jour. Washington Acad. Sci.* 29(7): 273-286. 10 fig. 1939.—A description of the fossil mammalian remains collected from the Dragon Paleocene deposits in central Utah by the 1938 Smithsonian Institution expedition in search of fossil vertebrates. The fossil localities are in or near Dragon Canyon in the western part of Emery County. The fauna now includes about 19 mammalian forms of which 9 are recognized as new species. Three new genera are proposed as follows: **CONORYCTELLA** (Taeniodonta); **DRACOCLAENUS** and **JEPSENIA** (Condylarthra). New species are described in *Catopsalis, Conoryctella, Anisonchus, Haploconus, Dracoclaenus, Ellipsodon*, and *Jepsenia*.—*C. L. Gazin.*

18095. **GOLDMAN, E. A. A new badger from Sonora.** *Jour. Washington Acad. Sci.* 29(7): 300-301. 1939.—*Taxidea taxus* **sonoriensis**.—*E. A. Goldman.*

18096. **GOLDMAN, E. A. Nine new mammals from islands in Great Salt Lake, Utah.** *Jour. Mammal.* 20(3): 351-357. 1939.—New subspp. in *Perognathus* (1), *Dipodomys* (3), *Onychomys* (1), *Reithrodontomys* (1), *Peromyscus* (2), and *Neotoma* (1).

18097. **GREGORY, JOSEPH T. Two new camels from the late Lower Pliocene of South Dakota.** *Jour. Mammal.* 20(3): 366-368. 1 fig. 1939.—*Pliancheniа* **magnifontis** and *Procamelus* **grandis**.

18098. **HAMILTON, W. J. Jr. Activity of Brewer's mole (Parascalops breweri).** *Jour. Mammal.* 20(3): 307-310. 1939.—In studies conducted in eastern New York during the summers of 1937 and 1938, surface burrows were marked by pressing in the roof of mole tunnels; observations on the time at which 973 repairs were made through the 24-hour period suggest that these moles are more active by day than at night. Records of 1383 repairs between 6 a.m. and 6 p.m. do not show rhythmic activity as is manifested in *Microtus* and *Peromyscus*.—*W. J. Hamilton, Jr.*

18099. **HAMLETT, G. W. D. Identity of Dasypus septemcinctus Linnaeus with notes on some related species.** *Jour. Mammal.* 20(3): 328-336. 1 fig. 1939.—The Linnaean species *D. septemcinctus* is identical with a small, widely distributed Brazilian armadillo that has been described under various other names. *D. hybridus*, of Argentina, is a distinct species. A key to the genus and condensed synonymies are given.—*G. W. D. Hamlett.*

18100. **HOWELL, ARTHUR H. Description of five new mammals from Florida.** *Jour. Mammal.* 20(3): 363-365. 1939.—New subspp. in *Scalopus* (1), *Peromyscus* (3), and *Sylvilagus* (1).

18101. **HUESTIS, R. R. Crater Lake Peromyscus.** *Jour. Mammal.* 20(3): 341-345. Map, 1939.—Mice taken on the Cascade Divide at Crater Lake are intermediate between *Peromyscus maniculatus rubidus* and *P. m. gambeli* in pelage characters based on hair count. In mean relative tail length the Cascade Divide sample lies between the means for this character in the *rubidus* and *gambeli* series used for comparison but is much nearer the latter race. In foot and ear length Cascade Divide mice are indistinguishable from *gambeli* and only slightly different from *rubidus*. The point of intergradation is different in the various characters used by taxonomists to separate geographic races. With the exception of a small difference in relative tail length *Peromyscus* taken at 3 points in Crater Lake National Park are similar to one another.—*Auth. summ.*

18102. **HUEY, LAURENCE M. A new Perognathus arenarius from near the U. S.-Mexican boundary in Lower California.** *Trans. San Diego Soc. Nat. Hist.* 9(13): 57-58. 1939.—*P. arenarius* **mexicalis**, northern Lower California, Mexico.—*L. M. Huey.*

18103. **HUEY, LAURENCE M. The silky pocket mice of southern California and northern Lower California, Mexico, with the description of a new race.** *Trans. San Diego Soc. Nat. Hist.* 9(11): 47-54. Map. 1939.—Reviews the small silky pocket mice in southern California (south of the Sierra Madre range) and northern Lower California, Mexico. *Perognathus longimembris* **internationalis**, Lower California side of International Boundary at Jacumba, San Diego County, California. *P. l. cantwelli* is reduced to synonymy with *P. l. pacificus*.—*L. M. Huey.*

18104. **HUEY, LAURENCE M. A new silky pocket mouse from southwestern Utah.** *Trans. San Diego Soc. Nat. Hist.* 9(12): 55-56. 1939.—*Perognathus longimembris virginis*, Washington County, Utah.

18105. **MILLER, GERRIT S. Jr., et al. Note on the lectotype of Lasiurus semotus (H. Allen).** *Jour. Mammal.* 20(3): 369-382. 1 fig. 1939.—Note on the lectotype of *Lasiurus semotus* (H. Allen), by GERRIT S. MILLER, JR.; Notes on the sex ratio in *Nycticeius humeralis*, by EMMET T. HOOPER; The leconte free-tailed bat *Tadarida cynocephala* in Alabama, by FRED S. BARKALOW, JR.; Notes on an otter fishing, by LAURENCE H. SMITH; Swimming power of the Canadian otter, by W. E. SCOTT; Sea otters and abalones, by JOHN E. CUSHING, JR.; Coyotes prey on goats, by ALBERT C. HAWBRECKER; Dental anomaly in an Eskimo dog, by GLOVER M. ALLEN; A weasel [*Mustela frenata noveboracensis*] trails a rabbit [*Sylvilagus* sp.], by EDWARD ADDY; Badgers in northeastern Missouri and southeastern Iowa, by RUDOLF BENNITT; Climbing ability of the northeastern chipmunk, by NORMAN A. PREBLE; Observations on red squirrel [*Tamiasciurus hudsonicus*] travel in treadwheel, by ADRIAN C. FOX; Occurrence of the bushy-tailed woodrat (*Neotoma cinerea*) at Fresno, California, by DOUGLASS H. HUBBARD; A swimming and diving meadow vole (*Microtus pennsylvanicus pennsylvanicus*), by W. FRANK BLAIR; Meadow mouse (*Microtus pennsylvanicus*) trapped by plant stalks, by C. HAVEN KOLB; Northern pine mouse (*Pitymys pinetorum*) in Minnesota, by DONALD M. HATFIELD; Notes on the house mice of California, by DAVID G. NICHOLS; The dusky pocket mouse (*Perognathus flavescens perniger* Osgood) in Iowa, by EDSON FICHTER; Re-assimilation of food by the banner-tail kangaroo rats (*Dipodomys spectabilis baileyi*), by F. W. MILLER; Attacks on porcupine by gray fox (*Urocyon cinereoargenteus*) and wildcats (*Lynx rufus*), by RICHARD LEE WEAVER; Notes on the Sierra Nevada flying squirrel (*Glaucomys sabrinus lascivus*), by VINCENT MOWBRAY; The hand capture of conies (*Ochotona*), by F. W. MILLER, and Highway mortality of rabbits in Idaho (Anonymous).

18106. **SHADLE, ALBERT R., and THOMAS S. AUSTIN. Fifteen months of beaver work in Allegany State Park, N. Y.** *Jour. Mammal.* 20(3): 299-303. 1 fig. 1939.—In one year 2 adult beavers cut 116 trees from 1 to 13 inches in diam., built 705 feet of dam, and constructed a house of 472 cu. ft. volume. From Aug. 11, to Nov. 11, 1938, the adults and 2 kits cut 150 trees 1 to 15 inches in diam., added 150 feet of dam, besides raising other dams, increased the volume of the house from 472 cu. ft. to 940 cu. ft., collected and stored a pile of winter food 30 feet long, 8 ft. wide and 3 to 4 feet deep. The order of food preference was: *Populus, Salix, Amelanchier, Carpinus*, and *Prunus*.—*A. R. Shadle.*

18107. **WARREN, EDWARD R., and E. RAYMOND HALL. A new subspecies of beaver from Colorado.** *Jour. Mammal.* 20(3): 358-362. Map. 1939.—*Castor canadensis* **concisor** is described; Monument Creek, El Paso County, Colorado, is the type locality.—*E. R. Hall.*

18108. **WOOD, ALBERT ELMER. Additional specimens of the heteromyid rodent Heliscomys from the Oligocene of Nebraska.** *Amer. Jour. Sci.* 237(8): 550-561. 2 pl. 1939.—A collection of specimens of *Heliscomys* from the Upper Oreodon Beds of western Nebraska adds considerably to our knowledge of this rodent. Associated upper and lower teeth, complete upper and lower dentitions, fragments of the skull, a partial radius and a partial manus, all referable to *H. hatcheri*, make this the best known species of the genus. This species shows strong resemblances to the early members of the Heteromyinae, to which it is tentatively referred, although all the other species of the genus are referable either to the Perognathinae or to the Dipodomyinae. This material throws no light on the origin either of the *Heliscomys* tooth pattern, or on that of the Geomyoidea in general.—*A. E. Wood.*

INTRODUCTORY GUIDE TO THE INDEXES

Users of Biological Abstracts are reminded that this volume covers only a part of the literature published in the period during which the volume was issued. Succeeding volumes must therefore also be consulted for literature more or less contemporaneous with that reported and indexed in this volume.

SUBJECT AND SYSTEMATIC INDEXES

GENERAL

These indexes are designed to meet the needs both of those whose interests lie chiefly in systematic groups of organisms and of those whose interests are not circumscribed in this way. For the former, chiefly systematic biologists, one of the requisite avenues of approach to their subject is by systematic groups; this is provided by the systematic index. Experience has shown that the needs of those concerned with other biological disciplines are most practically met by a detailed analytical subject index alphabetically arranged; an extensive index of this type is therefore provided.

A special effort has been made to design these two indexes as far as possible in such a way that they will complement rather than duplicate each other. Certain departures from standard indexes will therefore be noted. Chief among these is the policy in the systematic index of carrying the indexing only to genera, not to species.

This arrangement will be convenient for systematists as well, especially when seeking information concerning a limited number of given genera; under these circumstances the subject index will be found the more satisfactory, making consultation of the systematic index in such cases unnecessary. When, however, more comprehensive and extended systematic orientation is desired, the systematic index provides a complete condensed approach by groups and their subgroups down to and including genera.

THE SUBJECT INDEX

(p. 1894 to end)

This index is based upon an analysis of the abstract, not merely the title.

The words, terms, and expressions currently used for the same or closely related subjects vary greatly. If the indexing is done according to the particular words used by authors, much scattering of material concerning the same subject obviously results. Therefore the effort has been to index subjects and not merely words, and, where necessary, provide cross references which will lead the user from words commonly used to the rubrics under which the pertinent material has been assembled. Thus, studies on blood sugar are indexed under that rubric, not under "Hypoglycemia," "Hyperglycemia," or other terms used by authors to denote variations in blood sugar; because of their frequent use, however, "Hypoglycemia," "Hyperglycemia," etc., are entered in their respective alphabetic positions with cross references to "Blood sugar." Similarly, word indexing frequently scatters material referring to the same species; thus, material concerning the domestic fowl would appear under such diverse rubrics as hen, cock, pullet, capon, fowl, chicken, chick, etc.

While an effort has been made through subject indexing to avoid in a large measure the scattering resulting from word indexing, the index is, in the main, not a classified one. Since ease of use rather than strict logic is demanded of an index, the indexing so far as possible is done under the rubrics under which it is thought the majority of users are most likely to search. To this extent the index is frankly opportunistic. Thus the index contains rubrics for "Antibodies," "Antigens," "Complement," "Toxins," "Vaccines," etc., instead of relegating all to subordinate positions under some general rubric, *e.g.*, "Immunity." Since individual researches tend to be highly specialized, this general policy is believed to result usually in greater convenience to investigators.

This policy necessarily places closely related subjects in more or less widely separated alphabetical positions, and since the index should be useful not only to the specialist but also to those who wish a more comprehensive orientation in a wider field, cross references have been liberally employed to lead users to related material. Also, when the nature of the material has made it possible, the information has not only been entered under, for instance, the specific name of the substance, but has been listed again under the class or group to which it belongs. For example, the papers which deal with cyanides as fumigants appear with detailed entries under "Cyanides," as: "Cyanides, as fumigants, in black scale control, ... 14980," and are listed again, by number only, under "Fumigants," as: "Fumigants, cyanides as, ... 14980." Similarly, papers on specific stains are entered in detail under the name of the stain, *e.g.*, "Methylene blue," etc., and listed again by number only under "Stains." Cyanides and methylene blue cannot, however, be made exclusively subrubrics of "Fumigants" and "Stains," respectively, because of their importance in other directions.

There are some cases, however, in which there seems to be no necessity for thus scattering related material; especially in cases where there is an anatomical basis for grouping, material has been entered only under the larger group heading. Thus the bones, muscles, nerves, and the various parts of the brain are listed under "Bone," "Muscle," "Nerve," "Brain," rather than under "Ulna," "Sartorius," "Phrenic," "Amygdala," "Restiform body," etc.

Under very broad rubrics only those papers are in general indexed which themselves are broad in content or point of view. Thus, under "Physiology," "Pathology," "Cytology," "Horticulture," "Ecology," etc., will usually be found indexed only books or other general treatments; to do otherwise would make these headings unwieldy and more or less coextensive with the corresponding abstract sections.

Indexing under names of organisms

In general, indexing is done under the scientific name used in the original; *i.e.*, no attempt is made to select the name that might be considered correct under the rules where two or more names are in current use. This results in some scattering of references pertaining to the same organism, notably among bacteria, where several systems of nomenclature are current. However, specialists will know what names to consult in such cases; also, a limited amount of cross referencing is provided.

When common names only are used in the original, the indexing as a rule is done under these; allocation to genera would in many cases be difficult and introduce errors. Thus, if merely "Clover" appears in the original, it

is indexed under that name rather than under the genus *Trifolium*, since the plant in question may belong to some other of the several genera members of which are known as "Clovers." Where, however, there is no room for doubt as to the proper scientific name of an organism or group mentioned only by common name in the original, indexing may be done under the scientific name. Between common names and their possible, probable, or certain corresponding generic names, cross references have been provided in a limited number of cases.

Since the same generic name is sometimes used for both plants and animals, the alphabetical arrangement used in the subject index throws these together. In most cases these have been separated. Occasionally, however, the species listed under a generic name will be in part animal and in part plant; reference to the corresponding abstracts at once distinguishes between them.

Studies, especially experimental, on common laboratory animals (guinea pig, mouse, rat, rabbit, dog, cat, etc.) are in general not indexed under the name of the animal; the same applies to man, especially in the fields of physiology, pathology, and anatomy.

In view of the extensive systematic index, the indexing in the subject index is usually not done under group names above the rank of genus. Occasionally it appears desirable to insert references under larger group names, often in anglicized form, *e.g.*, "Diatoms," "Fishes," etc. However, every supergeneric group recognized and represented in the systematic index appears in the subject index in Roman type; the page number following refers to the page of the systematic index on which the group is treated, and the exponential figure attached to the page number refers to the column.

Similarly, the page and column references appearing after generic names refer to the exact places in the systematic index where these genera are treated systematically. *It is thus possible to determine instantly the classification of any genus occurring in the alphabetical subject index which appears also in the systematic index.* For example, the genus *Anopheles* in the alphabetic subject index is followed by "(p. 1877^3)"; reference to this page and column in the systematic index discloses that the genus falls in the family Culicidae, order Diptera, class Insecta.

Through the policies outlined in the two paragraphs preceding it is apparent that *the subject index provides at the same time a complete alphabetical index to the systematic index.* It is thus possible for users of the alphabetical subject index to orient themselves systematically as to both genera and supergeneric groups, thereby facilitating the utilization of systematic information—especially by those who find it difficult to do so when only a systematic approach is available. Furthermore, the user is at once put in touch with related genera and groups and the information recorded concerning them, thereby simplifying the problem of approaching a special problem against a background of broad orientation.

Typography

All generic names are in *italic type* (the only exceptions are new genera and subgenera, which appear in bold-faced capitals); all other first words in rubrics are in ordinary Roman type. This will be found convenient: if the search is for a generic name, all roman type rubrics can be ignored; if the search is for any other subject rubric, all italic names can be passed by automatically.

New genera and subgenera are printed in bold-faced capitals, *e.g.*, **ARENIGOBIUS**. Categories below the rank of genus are not indexed in first position, the sole exception being new subgenera.

For reasons of economy the indexing of new taxonomic units below the rank of genus has been greatly curtailed. We have endeavored to lead the user to the desired information in the abstract without duplicating that information in the indexes. Only a few of the new species, varieties, forms, combinations, and reductions to synonymy have been mentioned specifically in the index. If mentioned they are printed as follows:

New species, varieties, etc., appear in lower-case bold-faced type, *e.g.*, *Anopheles* **broussesi**, *Carex capillaris* v. **parvirostris**.

New specific, varietal, etc., names proposed to replace preoccupied names are printed in lower-case bold-faced type, with the replaced combination following in parentheses and in italic; *e.g.*, *Bitoma* **novella** (*B. maura*). If the preoccupation is the result of transferring a species from one genus to another, thus involving two generic names, the replaced binomial is also entered in first position, in italic, followed in parentheses by the new binomial (the new name appearing in lower-case bold face); *e.g.*, *Corixa dubia* (*Sigara* **paivai**).

In *new combinations* (*e.g.*, transfers of members from one genus to another), the specific name appears in lower-case bold-faced type, followed in parentheses and in italic by the genus from which the member is transferred; *e.g.*, *Anneslia* **anomala** (*Inga*). The old combination is also entered in first position, but wholly in italic, followed in parentheses and in italic by the genus to which the transfer is made: *Inga anomala* (*Anneslia*). If in making the transfer any change in specific, varietal, etc., names is made, the full combinations are given.

In the abstracts *new synonyms* are preceded by an equality sign and placed in parentheses; the name under which the synonym is sunk precedes, *e.g.*, *Sympronoe parva* (Claus) (=*S. anomala* Shoemaker).

A dagger (†) associated with a plant or animal name indicates that it is a *fossil.* The abbreviations in parentheses signify *geological periods,* as follows:

(Cb)	= Carboniferous	(N)	= Neogene
(Cm)	= Cambrian	(O)	= Ordovician
(D)	= Devonian	(Pl)	= Pleistocene
(E)	= Eogene	(Pr)	= Permian
(J)	= Jurassic	(S)	= Silurian
(K)	= Cretaceous	(Tr)	= Triassic

Some necessary variations from the above will be self-explanatory.

In the abstracts an asterisk (*) attached to a name indicates that the form is illustrated.

THE SYSTEMATIC INDEX

(pp. 1860-1883)

The indexing in the systematic index is limited to those disciplines in which the interest is more or less strongly by systematic groups, notably the taxonomic and morphological. The indexing is confined at present to the following subjects, the references being grouped correspondingly under the abbreviations given in parentheses:

Morphology, including anatomy (MORPH.)	Life History (L. H.)
Histology (HIST.)	Phylogeny (PHYL.)
Cytology (CYT.)	Geographical distribution (DIST.)
Embryology (EMB.)	Bibliography (BIBL.)
	Taxonomy (TAX.)

In departure from the policy of previous years, all taxonomic information, of whatever character—including the description of new species, subspecies, varieties, forms, aberrations, etc., and the publication of new names, new combinations, and new reductions to synonymy (but not including the erection of new genera or of supergeneric groups)—is assembled under the category TAX.

Superspecific entities (subgenera, genera, and higher groups) proposed as new to science are listed by name in bold-faced capitals, *e.g.*, **NOBOLIRA**. New genera appear in alphabetic order among the other genera of the particular group; new subgenera are indented under the corresponding genera; in new supergeneric groups the exact position of the names varies somewhat, depending upon the rank of the group and whether the name is merely indexed or whether utilized by the editor for arranging subordinate groups under it. All new superspecific group names, except genera, are accompanied by a statement of

the rank assigned to them by the authors, *e.g.*, n. subg., n. ord., etc.

Certain *fossil genera* of very doubtful position, or form genera of broad scope, are omitted from the systematic index; they are, however, included in the subject index.

Geographical distribution (**DIST.**) is in general entered in the systematic index only when treated more or less comprehensively or when data of apparently peculiar interest are presented. Some variation in this policy will be noted. Geographical distribution is, however, indexed fully by groups under geographical and political units in the Geographical Index (see below). This, it is believed, will be found useful because the interest in much recorded distributional information is local. However, by consulting the Geographical Index the student desiring more exhaustive information regarding distribution will be able to assemble easily the desired references.

Papers treating a group (family, order, etc.) more or less comprehensively from some point of view (morphology, taxonomy, cytology, etc.) are frequently indexed under the broader group, though they may also be entered under individual genera. However, new species, new varieties, new combinations, etc., are invariably referred to under the genera.

Genera are arranged alphabetically under groups, and are therefore easily located. If, on the other hand, the systematic index is consulted for subjects—cytology, embryology, life history, etc.,—the distinctive type used for the abbreviations renders the assembling of references from this point of view almost equally simple.

The *systems of classification* used in the various groups are determined by the editors in charge of the respective sections. In general the policy is to use conservative modern classifications; also, to omit intermediate groups, especially subfamilies (a few large families in Lepidoptera being the only exceptions). Since the purpose of the systems here used is chiefly to facilitate the location of desired information, it is believed that the omission of these taxonomic refinements will contribute to, rather than detract from, the utility of the index; furthermore, these refinements are more likely to be fluctuating and controversial, involving changes in successive volumes confusing to the user of the indexes.

GEOGRAPHICAL AND GEOLOGICAL INDEXES

THE GEOGRAPHICAL INDEX

(pp. 1884-1892)

This index is devoted to the indexing of geographical information, particularly the geographical distribution of organisms.

The various geographical areas adopted as units for indexing purposes are grouped under the following major headings: North America, South America, Europe, Africa, Asia, Malay Archipelago, Australasia, Antarctica, Oceanic Islands, and Oceans. The arrangement of the areas under each of these major headings is alphabetical except in the case of North America, where the countries are arranged in a general north-to-south sequence. The subdivisions of any country, such as the provinces of Canada or the separate states of the United States, are arranged alphabetically under that country.

Under each geographical area or unit, organisms are listed by group names arranged alphabetically and corresponding approximately to the systematic sections of current abstract issues; *e.g.*, "Coleoptera," "Fungi," "Mammalia," etc. Items of information pertaining to geographical distribution, but not readily classifiable by systematic groups, are entered in the index above the systematic group names.

A limited amount of indexing is done under the larger geographical units (*e.g.*, West Indies; Europe; Africa, northern), either because the papers in question treat the area more or less comprehensively or because the locality data are not sufficiently specific in the original to permit of more circumscribed allocation.

The names of all geographical areas or units adopted for indexing purposes are printed in their proper places in this index. A few, however, are followed by no abstract numbers; this indicates that the current volume contains no material for indexing under those names.

For indexing purposes, it is a general policy to include coastal islands with near-by mainland countries rather than with oceanic island groups. Likewise coastal waters, up to the 100-fathom line, are generally included with the adjoining mainland. Oceans include adjoining gulfs, bays, and smaller seas. For the most part, only aquatic organisms are indexed under oceans. For abstracts dealing with organisms of a certain kind of distribution, such as coastal fishes (Pisces) or pelagic birds (Aves), references may be given both under an ocean and under a land area.

A dagger (†) preceding an abstract number indicates that the abstract deals with a fossil organism or organisms.

Various letter symbols in parentheses signify *geological periods*, as follows:

(Cb)	= Carboniferous	(N)	= Neogene
(Cm)	= Cambrian	(O)	= Ordovician
(D)	= Devonian	(Pl)	= Pleistocene
(E)	= Eogene	(Pr)	= Permian
(J)	= Jurassic	(S)	= Silurian
(K)	= Cretaceous	(Tr)	= Triassic

Additional information on the distribution of organisms, as far as it pertains to the geological occurrence of fossil species, is indexed in the Geological Index under the names of the geological periods, on page 1893.

Abstract numbers in bold-faced type indicate that new taxonomic concepts (e.g., new species or subspecies) are proposed in the papers referred to.

THE GEOLOGICAL INDEX TO PALEONTOLOGICAL MATERIAL

(p. 1893)

This index is devoted to the indexing of paleontological information on the basis of the geological time scale. The sequence progresses from older to younger strata by eras and periods. Under each period organisms are listed by group names arranged alphabetically and corresponding approximately to the systematic sections of current abstract issues, *e.g.*, "Crustacea," "Gymnospermae," "Mammalia," etc.; the only important exception is represented by "Insecta," the orders of which are not separated. For a detailed systematic approach to paleontological material the Systematic Index (pp. 1860-1883) should be consulted.

A limited amount of indexing is done under the eras, either because the papers in question are more or less comprehensive or because the geological data are not sufficiently specific in the original to permit of allocation to periods.

In general, geographical locations are not included; for a geographical approach to paleontological material, the Geographical Index (pp. 1884-1892) should be consulted.

For an alphabetical approach to fossil forms, the Subject Index (p. 1894 to end) should be consulted.

Abstract numbers in bold-faced type indicate that new taxonomic concepts (e.g., new species or subspecies) are proposed in the papers referred to.

AUTHOR INDEX

B

C

D

G

K

L

N

O

P

Q

R

S

T

X

Y

Z

SYSTEMATIC INDEX

(For introductory guide see pages 1812-1813)

PLANT KINGDOM

ALGAE

(Classification according to Engler and Prantl, "Die Natürlichen Pflanzenfamilien," 2nd ed., supplemented where yet incomplete by the 1st ed., and by Pascher, "Susswasserflora Deutschlands, u. s. w.," and other sources.)

MYXOPHYCEAE

CHLOROPHYACEAE

XANTHOPHYCEAE (HETEROKONTAE)

CHLOROMONADOPHYCEAE (CHLOROMONADALES)

(No material)

EUGLENOPHYCEAE (EUGLENALES)

(No material)

CHRYSOPHYCEAE

DINOPHYCEAE

(See Dinoflagellida, under Protozoa, p. 1868 [1])

BACILLARIOPHYCEAE (DIATOMACEAE)

PHAEOPHYCEAE

RHODOPHYCEAE

INCERTAE SEDIS

SCHIZOMYCETES · MYXOMYCETES · FUNGI (including LICHENES)

PROMYCETES

BASIDIOMYCETES

DEUTEROMYCETES

INCERTAE SEDIS

BRYOPHYTA

HEPATICAE

MUSCI

PTERIDOPHYTA

FILICALES

ARTHROPHYTA

LEPIDOPHYTA

ISOETALES

ISOETACEAE

Isoetes, **CYT.**, 7109; **TAX.**, 17507
Isoetites, **DIST.**, **TAX.**, (K) 13717
Pseudobornia, **TAX.**, (D) 10097

INCERTAE SEDIS

(In Lepidophyta)

Helionella, **TAX.**, (D) 10097

PSILOPHYTA

PSILOPHYTALES

MORPH., **PHYL.**, (†) 2785

Arachnoxylon, **DIST.**, **MORPH.**, **TAX.**, (†) 2785
Barinophyton, **DIST.**, **TAX.**, (D) 13716
Hostimella, **DIST.**, **TAX.**, (D) 13716
Psilophyton, **DIST.**, (D) 3235, (D) 13716
Schizopodium, **DIST.**, **TAX.**, (†) 2785

INCERTAE SEDIS

(In Pteridophyta)

Aphlebia, **DIST.**, **TAX.**, (†) 2786
Aphyllopteris, **DIST.**, **TAX.**, (D) 13716
Callistopteris, **TAX.**, 8421
Calymmatotheca, **TAX.**, (Cb) 8368
Chiropteris, **DIST.**, **TAX.**, (Pr) 15432
Diplostachyum, **TAX.**, 6376
Macroglena, **TAX.**, 8421
Mecodium, **TAX.**, 8421
Sphenopteridium, **TAX.**, (D) 10097
Thursophyton, **DIST.**, (D) 3235

SPERMATOPHYTA

BIBL., 1691; **HIST.**, 17556, 17557, 17560; **PHYL.**, 2785, 2905, 4722; **TAX.**, 2820, 2821

GYMNOSPERMAE

TAX., 2823

PTERIDOSPERMOPHYTA

(CYCADOFILICALES)

L. H., **MORPH.**, 8369

Adiantites, **DIST.**, **TAX.**, (†) 2786
Archaeopteris, **DIST.**, **TAX.**, (D) 13716
Callipteris, **DIST.**, **TAX.**, (Pr) 15432
Cardiopteridium, **L. H.**, (Cb) 10095
Conostoma, **MORPH.**, (†) 15431
Crossotheca, **MORPH.**, 8369
Kalymma, **TAX.**, (Cb) 8368
Lagenospermum, **TAX.**, (Cb) 10095
Medullosa, **HIST.**, **TAX.**, 10098
ANGLOROTA, **N. SUBG.**, 10098
Pachytesta, **MORPH.**, (†) 15431
Pterispermostrobus, **TAX.**, (†) 8369
Sarmatopsis, **TAX.**, (Cb) 8368
Stenomyelon, **TAX.**, (Cb) 8368
TETRASTICHIA, (Cb) 8370

CYCADOPHYTA

CYCADALES

CYCADACEAE

Cycas, **MORPH.**, 11917; **TAX.**, 1111

CONIFEROPHYTA

CORDAITALES

L. H., **MORPH.**, 8369

Callixylon, **DIST.**, (D) 13716
CAULOXYLON, (K) 13718

CONIFERALES

PHYL., **TAX.**, 1169

TAXACEAE

Dacrydium, **TAX.**, 15484
Podocarpus, **TAX.**, 15484
Saxegothaea, **EMB.**, 11915, 11921; **MORPH.**, 11921; **PHYL.**, 11915; **TAX.**, 15484

PINACEAE

HIST., 15517; Abieteneae, **PHYL.**, 4761

Abies, **MORPH.**, 6446; **TAX.**, 15486
Actinostrobus, **EMB.**, 1164
Araucaria, **TAX.**, 15484
Callitris, **DIST.**, (N) 13721
Cedrus, **TAX.**, 6378
Chamaecyparis, **DIST.**, 1283
Cupressinoxylon, **DIST.**, (†) 13715
Cupressus, **TAX.**, (N) 17475
Fitzroya, **TAX.**, 15484
Glyptostrobus, **DIST.**, (N) 13721
Juniperus, **CYT.**, **MORPH.**, 15523; **EMB.**, 10165; **TAX.**, 8425
Keteleeria, **TAX.**, (E) 4724
Larix, **HIST.**, 13785
Libocedrus, **DIST.**, (N) 13721; **TAX.**, 15484
Picea, **MORPH.**, 1112, 2826, 3030, 6446, 6447; **PHYL.**, 2826; **TAX.**, (N) 4725, 10118, 15486
Pilgerodendron, **TAX.**, 15484
Pinus, **DIST.**, 10352, (N) 13721, 15485; **HIST.**, 2917, 8446, 8448, 15517; **MORPH.**, 1312, 2911, 6446, 15485; **PHYL.**, 2825; **TAX.**, 2827, 4800, 15485, (N) 17475, 17513
Pseudotsuga, **MORPH.**, 2823; **TAX.**, 2823, 11853A, (N) 17475
Sciadopitys, **TAX.**, (E) 4724
Sequoia, **DIST.**, (†) 13715, (N) 13721; **EMB.**, 6440, 10163, 17511; **HIST.**, 17511; **PHYL.**, 10163; **TAX.**, 10163, 17511
SEQUOIADENDRON, 17511
Taxodium, **DIST.**, (N) 13721; **MORPH.**, 6443; **TAX.**, 6381, 15486
Thuja, **TAX.**, 15486

INCERTAE SEDIS

(In Coniferales)

Protophyllocladus, **TAX.**, (K) 17476

GNETALES

GNETACEAE

PHYL., **TAX.**, 1169

Ephedra, **DIST.**, (†) 7048

ANGIOSPERMAE

CYT., 50; **PHYL.**, 4810, 11919; **TAX.**, 11855

MONOCOTYLEDONES

MORPH., 17514

PANDANALES

TYPHACEAE

Typha, **MORPH.**, 4766

PANDANACEAE

Freycinetia, **TAX.**, 11868
Pandanus, **DIST.**, 1114, 1116; **TAX.**, 1116, 11868

NAJADALES (HELOBIAE)

POTAMOGETONACEAE

Potamogeton, **DIST.**, 6432; **TAX.**, 2833

HYDROCHARITACEAE

Boottia, **TAX.**, 6391
Vallisneria, **MORPH.**, **TAX.**, 10168

TRIURIDALES

TRIURIDACEAE

Sciaphila, **TAX.**, 8426

GRAMINALES

(GLUMIFLORAE)

PHYL., **TAX.**, 1121

POACEAE

(GRAMINEAE)

CYT., 5290, 10718; **DIST.**, 15490; **MORPH.**, 6450, 15526; **PHYL.**, 5290; **TAX.**, 6434, 11857, 11866, 15490

Acroceras, **TAX.**, 8427
Agropyron, **TAX.**, 1120, 2835, 10122
Agrostis, **TAX.**, 1158, 4800
Aira, **CYT.**, **DIST.**, 14345
Alloteropsis, **TAX.**, 15483
Andropogon, **TAX.**, 2828
Aristida, **DIST.**, (†) 7048
Arundinaria, **TAX.**, 6387
Arundinella, **TAX.**, 8427
Avena, **CYT.**, 5292, 16159; **MORPH.**, 6445; **TAX.**, 1158
Brachiaria, **TAX.**, 15483
Bromus, **TAX.**, 1158
Cenchrus, **MORPH.**, 17514; **TAX.**, 17537
Cleistogenes, **TAX.**, 2835
Ctenium, **MORPH.**, **TAX.**, 13745
Cymbopogon, **TAX.**, 8427
Cynosurus, **MORPH.**, 17514
Danthonia, **TAX.**, 1158
Deschampsia, **CYT.**, **DIST.**, 14345
Deyeuxia, **TAX.**, 8427
Digitaria, **TAX.**, 15489
Ehrharta, **TAX.**, 15483
Elymus, **TAX.**, 1158
Eragrostis, **TAX.**, 15489
Festuca, **DIST.**, 1102; **TAX.**, 1102, 8444
Helictotrichon, **TAX.**, 8427
Hordeum, **TAX.**, 2926
Hyparrhenia, **TAX.**, 2828, 8427
Imperata, **TAX.**, 6395
Ischaemum, **TAX.**, 8427
Jouvea, **MORPH.**, **PHYL.**, 10123
Loudetia, **TAX.**, 2828
Melinis, **TAX.**, 15483
Microstegium, **TAX.**, 8427, 15483
Muhlenbergia, **TAX.**, 1158
Nephelochloa, **MORPH.**, 17514
Panicum, **CYT.**, 1703; **MORPH.**, 17514; **TAX.**, 1158, 6484, 15483, 17516
Paspalum, **TAX.**, 15489
Pennisetum, **MORPH.**, 17514; **TAX.**, 6484
Periballia, **MORPH.**, 17514
Phragmites, **DIST.**, (†) 7048
Poa, **DIST.**, 13747; **TAX.**, 1158, 8426, 13747
Puccinellia, **TAX.**, 2835
Rottboellia, **TAX.**, 8427
Sasa, **TAX.**, 6387, 6388, 6389
Schizachyrium, **TAX.**, 2828, 8427
Sclerostachya, **TAX.**, 8427
Secale, **CYT.**, 42, 14348, 16154
Setaria, **CYT.**, 1703; **MORPH.**, 17514; **TAX.**, 2828, 6484, 8426
Sorghastrum, **TAX.**, 2828
Sorghum, **TAX.**, 6484, 10120
Spartina, **MORPH.**, 11929
Sphenopholis, **TAX.**, 1158
Stipa, **TAX.**, 1158, 2835
Themeda, **TAX.**, 8427
Tricholaena, **MORPH.**, 11916
Trisetum, **TAX.**, 1158
Tristachya, **TAX.**, 11865
Triticum, **CYT.**, 42, 1698, 7098, 7099, 7130, 12503, 12509, 13744, 16154, 16156, 16159; **MORPH.**, 13744; **TAX.**, 13744
Zea, **CYT.**, 1698, 8909, 10717; **MORPH.**, 6450

CYPERACEAE

CYT., 7106, 17563; **MORPH.**, 17563

Capitularia, **TAX.**, 11873
Carex, **CYT.**, **EMB.**, **MORPH.**, 6448; **DIST.**, 17515; **TAX.**, 1119, 6393, 6394, 8425, 11869, 11870, 11871
Cladium, **TAX.**, 8428
Cyperus, **TAX.**, 6390, 8426
Fimbristylis, **TAX.**, 1118, 11871
Hypolytrum, **TAX.**, 11873
Lepidosperma, **TAX.**, 8428
Mapania, **TAX.**, 11873
Pycreus, **TAX.**, 2832
Rynchospora, **TAX.**, 2828A
Scirpus, **TAX.**, 8426

PALMALES (PRINCIPES)

PALMACEAE (PALMAE)

TAX., (E) 4724

Actinophloeus, **TAX.**, 11860
Areca, **TAX.**, 10121, 15487
Astrocaryum, **TAX.**, 13746
Borassus, **TAX.**, 6383
Calamus, **TAX.**, 1113
Calyptrocalyx, **TAX.**, 10121
Chrysalidocarpus, **DIST.**, 11861
Coccothrinax, **TAX.**, 11862
Cyrtostachys, **TAX.**, 11864
Erythea, **MORPH.**, 13781
Geonoma, **TAX.**, 11863
Gronophyllum, **TAX.**, 11864, 15488
Gulubia, **TAX.**, 10121
Heterospathe, **TAX.**, 10121
Hydriastele, **TAX.**, 11864
Hyospathe, **TAX.**, 2831
Hyphaene, **TAX.**, 6383
Korthalsia, **TAX.**, 11864
Leptophoenix, **TAX.**, 15488
Licuala, **TAX.**, 11864
Livistona, **TAX.**, 11864
Nengella, **TAX.**, 11864
Orania, **TAX.**, 10121, 11864
PARAGULUBIA, 10121
Paralinospadix, **TAX.**, 11864
ATOPOCARPUS, **N. SUBG.**, 11864
Pinanga, **TAX.**, 15487
PSEUDOPINANGA, 15487
Ptychococcus, **TAX.**, 11864
STOLIDOTOCOCCUS, **N. SUBG.**, 11864
Ptychosperma, **TAX.**, 11860
REHDEROPHOENIX, 10121
STRONGYLOCARYUM, 10121

CYCLANTHALES (SYNANTHAE)

CYCLANTHACEAE

Cyclanthera, **CYT.**, 12508

ARALES (SPATHIFLORAE)

ARACEAE

Ambrosia, **TAX.**, 13762
Anthurium, **TAX.**, 2827A, 2828A
Calamus, **TAX.**, 11864
Dieffenbachia, **TAX.**, 2827A
Remusatia, **MORPH.**, 4768

LEMNACEAE

Wolffiella, **MORPH.**, 2836

XYRIDALES (FARINOSAE)

CENTROLEPIDACEAE

Centrolepis, **DIST.**, 1115

XYRIDACEAE

Xyris, **MORPH.**, 2839

ERIOCAULACEAE

Eriocaulon, **TAX.**, 4769
Lachnocaulon, **TAX.**, 4769
Paepalanthus, **TAX.**, 4769
Syngonanthus, **TAX.**, 4769

BROMELEACEAE

TAX., 2841

Catopsis, **TAX.**, 2841
Hechtia, **TAX.**, 2841
Pitcairnia, **TAX.**, 2834, 11867
Thecophyllum, **TAX.**, 2828A
Tillandsia, **TAX.**, 2828A, 2841
Vriesia, **TAX.**, 2841
Tradescantia, **CYT.**, 1702, 1706, 1710, 1711, 1712, 7100, 7108, 10715

LILIALES (LILIIFLORAE)

JUNCACEAE

CYT., **MORPH.**, 17563

Juncus, **TAX.**, 1158

DICOTYLEDONES (*Continued*)

SYSTEMATIC INDEX

(For introductory guide see pages 1812-1813)

ANIMAL KINGDOM

PROTOZOA

(System of classification in general according to G. N. Calkins, "Biology of the Protozoa" (1926); Foraminifera, according to J. A. Cushman, "Foraminifera, their Classification and Economic Use" (1928).)

PORIFERA · COELENTERATA · STROMATOPOROIDEA · GRAPTOLITOIDEA CTENOPHORA

PLATYHELMINTHES (including NEMERTEA) · MESOZOA

SIPUNCULOIDEA · GASTROTRICHA · ECHINODERA ROTATORIA · CHAETOGNATHA

SIPUNCULOIDEA

(Vacant)

GASTROTRICHA

TAX., 14222

CHAETONOTOIDEA

CHAETONOTIDAE
Chaetonotus, TAX., 6804, 14221

ECHINODERA

(Vacant)

ROTATORIA

PLOIMA

NOTOMMATIDAE
Dicranophorus, TAX., 6806, 6807
Lindia, TAX., 6806, 6807
Notommata, TAX., 6806, 6807
Proales, TAX., 6806, 6807
Squatinella, TAX., 6807

TRICHOCERCIDAE
Trichocerca, TAX., 6805, 6807

BRACHIONIDAE
Brachionus, MORPH., 14220
Keratella, TAX., 6807

EUCHLANIDAE
Euchlanis, TAX., 6807
Lecane, TAX., 6805, 6807
Lepadella, TAX., 6807
Trichotria, TAX., 6807

FILINIIDAE
Filinia, TAX., 6807

TESTUDINELLIDAE
PSEUDOPLOESOMA, 6807

BDELLOIDA

PHILODINIDAE
Dissotrocha, TAX., 14219

CHAETOGNATHA

Sagitta, DIST., 10794

ANNELIDA

DIST., TAX., (J) 15943

POLYCHAETA

BIBL., DIST., MORPH., TAX., 1606
Polychaeta, TAX., 17966

AMPHINOMIDAE
Notopygos, TAX., 17964

EUPHROSYNIDAE
Euphrosyne, TAX., 6816

POLYNOIDAE
TAX., 6813
Arctonoë, TAX., 17962
Halosydna, TAX., 17962
HALOSYDNELLA, 6813
Harmothoe, TAX., 1606
Hesperonoë, TAX., 17962

APHRODITIDAE
Aphrodita, TAX., 17962

ACOETIDAE
TAX., 6813

NEPHTHYIDAE
TAX., 17963
Nephthys, TAX., 17962, 17963

SYLLIDAE
Procerastea, EMB., 11466

NEREIDAE
DIST., TAX., 1607
Ceratonereis, TAX., 17962
Neanthes, TAX., 1607
Nereis, TAX., 17962

LEODICIDAE
Palolo, TAX., 1608

LUMBRINEREIDAE
Arabella, TAX., 17962
Aracoda, TAX., 17962
Drilonereis, TAX., 17962
Lumbrinereis, CYT., 1733; HIST., 2479; TAX., 17962

STAUROCEPHALIDAE
Stauronereis, TAX., 1608

GLYCERIDAE
Glycera, TAX., 17962
Hemipodus, TAX., 1608

ARICIIDAE
Scoloplos, TAX., 17962

SPIONIDAE
Spio, TAX., 17962

CHAETOPTERIDAE
Chaetopterus, CYT., 7120, 12512; EMB., 13343; MORPH., 17965

CIRRATULIDAE
Cirratulus, TAX., 17962

OPHELIIDAE
Armandia, TAX., 1608
Ophelia, DIST., TAX., 1605; MORPH., 1605, 12306
PECTINOPHELIA, 1608
Thoracophelia, TAX., 1608
Travisia, TAX., 1608

SCALIBREGMIDAE
Gwasitoa, TAX., 17962
Kebuita, TAX., 17962

SABELLIDAE
Branchiomma, TAX., 17962
Demonax, TAX., 17962
Distylia, TAX., 17962
Eudistylia, TAX., 17962
Laonome, TAX., 17962
Megalomma, TAX., 17962
Myxicola, TAX., 17962
Potamilla, TAX., 17962
Pseudopotamilla, TAX., 17962
SABELLASTARTE, 1606

SERPULIDAE
Protula, TAX., 17962
Serpula, DIST., TAX., (J) 15943

MYZOSTOMIDA

MYZOSTOMIDAE
Myzostoma, L. H., TAX., 3290

OLIGOCHAETA

AEOLOSOMATIDAE
Aeolosoma, TAX., 6815

TUBIFICIDAE
Limnodrilus, EMB., 11467
Tubifex, EMB., 11467

LUMBRICULIDAE
Rhynchelmis, CYT., 1728

GLOSSOSCOLECIDAE
Glyphidrilus, MORPH., 3289

LUMBRICIDAE
Allolobophora, TAX., 6810
Dendrobaena, TAX., 6811
Eisenia, HIST., MORPH., 5968; TAX., 6811
Eophila, TAX., 6811
Lumbricus, CYT., 5970

HIRUDINEA

HIRUDIDAE
CYT., 5970
Hirudinaria, HIST., 2474

ECHIURIDA

ECHIURIDAE
Echiurus, HIST., 6808
Urechis, EMB., 766, 4398, 17065

BRACHIOPODA · BRYOZOA · PHORONIDEA

BRACHIOPODA

(Classification according to Scguchert and LeVene, "Classification of Brachiopod Genera, Fossil and Recent" (1929).)
DIST., TAX., (J) 15943; TAX., 6819

NEOTREMATA

ACROTRETIDAE
PROTOTRETA, (Cm) 6818

CRANIIDAE
Cardinocrania, TAX., (†) 12310

PROTREMATA

CHONETIDAE
ANOPLIOPSIS, (Cb) 3291

PRODUCTIDAE
Marginifera, TAX., (Cb) 3291
Productus, TAX., 3292
SETIGERELLA, N. SUBG., (†) 3292
WORTHENELLA, N. SUBG., (†) 3292
Waagenoconchia, DIST., (Pr) 5082

RICHTHOFENIIDAE
Richthofenia, TAX., (†) 12310

TELETREMATA

SPIRIFERIDAE
Spirifer, TAX., (D) 16001

ATHYRIDAE
Anathyris, TAX., (D) 16001

TEREBRATULIDAE
Terebratula, TAX., (D) 16001
TRIATHYRIS, (D) 16001
PRADOIA, (D) 16001

TEREBRATELLIDAE
Macandrevia, TAX., 16003
Trigonosema, TAX., 16002
WALDHEIMIATHYRIS, N. NAME, 16003

BRYOZOA

(Classification according to R. S. Bassler, "Classification of Bryozoa, Fossil and Recent" (1932).)

ECTOPROCTA

CTENOSTOMATA

MONOBRYOZOONTIDAE
Monobryozoon, MORPH., 6820

PHORONIDEA

(Vacant)

ECHINODERMATA

EMB., 767; TAX., (J, Ter, Tr) 16007

PELMATOZOA

CRINOIDEA

DIST., TAX., (J) 15943

ACROCRINIDAE
Acrocrinus, TAX., (Cb) 10555

POTERIOCRINIDAE
Agassizocrinus, TAX., (Cb) 10555
Cibolocrinus, TAX., (Cb) 10555
Delocrinus, TAX., (Cb) 10555
DIPHUICRINUS, (Cb) 10555
Ethelocrinus, TAX., (Cb) 10555
Hydriocrinus, TAX., (Cb) 10555
MORROWCRINUS, 10555
PARADELOCRINUS, (Cb) 10555
PARAPLASOCRINUS, (Cb) 10555
PERIMESTOCRINUS, (Cb) 10555
PLAXOCRINUS, (Cb) 10555
SCIADIOCRINUS, (Cb) 10555
Scytalocrinus, TAX., (Cb) 10555
STUARTWELLERCRINUS, (Cb) 10555
UTHAROCRINUS, (Cb) 10555
XYSTOCRINUS, (Cb) 10555
Zeacrinus, TAX., (Cb) 5113

ASTEROZOA

ASTEROIDEA

ASTERINIDAE
Patiria, HIST., 10551

BENTHOPECTINIDAE
Benthopecten, TAX., 14225

BRISINGIDAE
Freyella, TAX., 10552

ECHINASTERIDAE
Poraniopsis, TAX., 10554

GANERIIDAE
ALEUTIASTER, 14224

HELIASTERIDAE
Heliaster, TAX., 14225

OREASTERIDAE
Nidorellia, TAX., 14225

OPHIUROIDEA

AMPHIURIDAE
Ophiactis, TAX., 10553

OPHIOLEPIDIDAE
Ophiura, TAX., (N) 5112

OPHIOTRICHIDAE
Ophiothrix, TAX., 10552, 10553

ECHINOZOA

ECHINOIDEA

ARBACIIDAE
Arbacia, EMB., 4388, 4390, 8059, 8060; MORPH., 16006

CENTRECHINIDAE
Diademopsis, TAX., (Tr) 16007
Heterodiadema, TAX., (K) 14227

ECHINIDAE
Psammechinus, EMB., 9788, 11462

FIBULARIIDAE
Fibularia, TAX., (Ter) 16007

HEMIASTERIDAE
Hemiaster, TAX., (J) 16007

SALENIIDAE
Garelia, TAX., 14225
Salenia, TAX., 14225

SCUTELLIDAE
Astriclypeus, EMB., 4397
Dendraster, EMB., 766, 5972, 17050

SPATANGIDAE
Micrasterias, TAX., 3293

HOLOTHURIOIDEA

CUCUMARIIDAE
Pentacta, TAX., 3413
Phyllophorus, TAX., 3294
Thyone, HIST., MORPH., 5969; TAX., 3294

HOLOTHURIIDAE
Holothuria, TAX., 3294
Labidodemas, TAX., 3294

INCERTAE SEDIS
(In Holothurioidea)
Auricularia, TAX., 16004
EUPHYLLOPHORUS, 3294
EUTHYONIDIUM, 3294
NEOTHYONIDIUM, 3294
Pattalus, TAX., 3294
Pentamera, TAX., 3294

MOLLUSCA

L. H., 3279, 8993; MORPH., 16011; TAX., 3299, 3300, 10562

AMPHINEURA

MORPH., PHYL., 16011

LEPIDOPLEURIDAE
Lepidopleurus, MORPH., 16011

ISCHNOCHITONIDAE
Callistochiton, TAX., 3295
Ischnochiton, TAX., 3295
Tonicella, MORPH., 16011

ACANTHOCHITIDAE
Acanthochitona, MORPH., 16011
Lepidochitona, MORPH., 16011

CONULARIDA

TENTACULITIDAE
Tentaculites, TAX., (D) 10556

GASTROPODA

CYT., 4342, 7115, 8056; DIST., TAX., (J) 15943; HIST., 8062

DOCOGLOSSA

ACMAEIDAE
Acmaea, DIST., TAX., (J) 15943
Scurriopsis, DIST., TAX., (J) 15943

RHIPIDOGLOSSA

PLEUROTOMARIIDAE
Murchisonia, TAX., (†) 14231
Orestes, TAX., 14231
PHYMATOPLEURA, (Cb) 14231
TAOSIA, TAX., (Cb) 14231

FISSURELLIDAE
Emarginula, DIST., TAX., (J) 15943

TURBINIDAE
Astralium, TAX., (Pl) 16010
Eucyclus, DIST., TAX., (J) 15943
Leptothyra, TAX., (Pl) 16010

TROCHIDAE
Calliostoma, TAX., (Pl) 16010

HELICINIDAE
Hendersonia, DIST., 8745

TAENIOGLOSSA (NON-MARINE)

VIVIPARIDAE
CYT., 8919
Paludina, TAX., 10565
Viviparus, TAX., 10567

TRUNCATELLIDAE
Oncomelania, TAX., 10557

MELANIIDAE
Cleopatra, TAX., 3297
Melania, TAX., 10565, (E) 16009

TAENIOGLOSSA-MARINE

ADEORBITIDAE
Vitrinella, TAX., (Pl) 16010

NATICIDAE
Ampullina, TAX., 16008
Sinum, TAX., 6828

TURRITELLIDAE
Turritella, TAX., 5122, (Pl) 16010

PSEUDOMELANIIDAE
Chemnitzia, DIST., TAX., (J) 15943
Pseudomelania, TAX., 16008
Trajanella, TAX., (K) 16008

TAENIOGLOSSA-SIPHONATE

CERITHIIDAE
Campanile, TAX., (E) 10558

CASSIDIDAE
Semicassis, TAX., 6828

GYMNOGLOSSA

ENTOCONCHIDAE
Entocolax, MORPH., TAX., 5116

STENOGLOSSA

MURICIDAE
Purpura, L. H., 3303

MITRIDAE
Mitra, TAX., 6828

CANCELLARIIDAE
Cancellaria, TAX., 6828

CONIDAE
Conus, TAX., 6828

OPISTHOBRANCHIA
EMB., 8054

LIMACINIDAE
Limacina, HIST., MORPH., 6822; L. H., 5392, 10559

TETHYIDAE
Aplysia, EMB., 770

DUVAUCELIIDAE
Duvaucelia, MORPH., 8746

POLYCERIDAE
Polycera, MORPH., 8746

AEOLIDIIDAE
Eubranchus, MORPH., 8746

LIMAPONTIIDAE
Limapontia, MORPH., 8746

BASOMMATOPHORA

LYMNAEIDAE
Limnaea, DIST., 12261; MORPH., TAX., 12313

STYLOMMATOPHORA

ACHATINELLIDAE
Achatinella, DIST., 8747

ARIONIDAE
Arion, L. H., 12182; MORPH., TAX., 5118

ZONITIDAE
TAX., 5114
Asperitas, TAX., 6825
COOKEANA, 5114
Diastole, TAX., 5114
KUSAIEA, 5114
Lamprocystis, TAX., 5114
Liardetia, TAX., 5114
MENDANA, 5114
Microcystis, TAX., 5114
PUKALOA, 5114
Sasakina, TAX., 6825
Thapsia, TAX., 3297

LIMACIDAE
Agriolimax, EMB., L. H., 1609; L. H., 12182

ACHATINIDAE
Clavator, TAX., (E) 16009

OLEACINIDAE
Salasiella, TAX., 12316

HELICIDAE
Helix, TAX., 10567

CLAUSILIIDAE
Nenia, TAX., 10566
NENISCA, N. SUBG., 10566
PARANENIA, N. SUBG., 10566

PELECYPODA

DIST., TAX., (J) 15943; TAX., 12315

FILIBRANCHIA

ARCIDAE
Anadara, TAX., 6828
Arca, HIST., 5884; MORPH., 10560; TAX., 6828

MYTILIDAE
Modiolus, MORPH., 10560
Mytilus, MORPH., 10560
Septifer, MORPH., 10560

AMBONYCHIIDAE
Allonychia, DIST., TAX., (O) 3234

PECTINIDAE
Chlamys, TAX., 6828

DIMYIDAE
Dimyodon, DIST., TAX., (J) 15943

ANOMIIDAE
Heteranomia, MORPH., 3301
Placunopsis, DIST., TAX., (J) 15943

EULAMELLIBRANCHIA

OSTREIDAE
Gryphea, L. H., 14406
Ostrea, L.H., 5407, 7240, 10805, 10808, 12631, 14406

PINNIDAE
Pinna, MORPH., 10560

DREISSENIDAE
Dreissena, MORPH., 10560

PLEUROPHORIDAE
Anisocardia, DIST., TAX., (J) 15943
Cypricardia, DIST., TAX., (J) 15943

ASTARTIDAE
Opisoma, DIST., TAX., (J) 15943

LEPTONIDAE
Mysella, MORPH., 3301

SPHAERIIDAE
Pisidium, TAX., 6420

UNIONIDAE
TAX., 8743, 8744
Margaritana, DIST., 14394

CARDIIDAE
Cardium, DIST., TAX., (J) 15943; MORPH., 3301

TRIDACNIDAE
Hippopus, MORPH., 10560
Tridacna, MORPH., 10560

VENERIDAE
Antigona, TAX., 6828
Chione, TAX., 6828
Paphia, TAX., 1612
Venus, L. H., 9055

TELLINIDAE
Tellina, TAX., 6828

SEMELIDAE
Cumingia, CYT., 12512
Semele, TAX., 6828

SOLENIDAE
Cultellus, MORPH., 3301
Ensis, MORPH., 3301
Psammosolen, TAX., 6828

SAXICAVIDAE
Hiatella, MORPH., 3301

GASTROCHAENIDAE
Gastrochaena, TAX., 6828

PHOLADIDAE
Barnea, MORPH., 3301
Pholadidea, MORPH., 3301
Pholas, HIST., 5884

TEREDINIDAE
Bankiella, HIST., 5884
Teredo, MORPH., 3301

CEPHALOPODA

NAUTILOIDEA
Aturia, MORPH., 5119
Zitteloceras, TAX., (O) 10561

AMMONOIDEA

LIPAROCERETIDAE
TAX., (J) 7742
Anthracoceras, TAX., 8741
PLATYNOTICERAS, (J) 8742

DIBRANCHIA

LOLIGINIDAE
Loligo, L. H., 1611

OCTOPODIDAE
Eledone, HIST., 703
Octopus, HIST., 703
Polypus, L. H., 1610

ARTHROPODA

BIBL., 3238; MORPH., 9790; PHYL., 1694, 12333

MYRIOPODA · ONYCHOPHORA

MYRIOPODA

TAX., 5124

SYMPHYLA

Symphylella, TAX., 8798

DIPLOPODA

ONYCHELIDAE, N. FAM., 6829

ONYCHELIDAE
Onychelus, TAX., 6829

POLYDESMIDAE
Polydesmus, TAX., 16014

CHELODESMIDAE
Amphelictogon, TAX., 5124

CRYPTODESMIDAE
ENEILISSOMINAE, 12319; **MAURITACANTHINAE, N. SUBFAMS.,** 12319
HYSTRICHODESMUS, TAX., 5124

COMODESMIDAE
TAX., 5124

VANHOEFFENIIDAE
TAX., 5124

STRONGYLOSOMIDAE
LEIOMODESMUS, 5124

OXYDESMIDAE
TAX., 8748
Kamerunomus, TAX., 8748
Odontokrepis, TAX., 8748
Paracordyloporus, TAX., 8748
Scolopopleura, TAX., 8748

CRASPEDOSOMIDAE
Ceratosoma, TAX., 16014
Craspedosoma, TAX., 16014

OROBAINOSOMIDAE
Orobainosoma, TAX., 16014

JULIDAE
Leptojulus, TAX., 16014

SPIROBOLIDAE
Cubobolus, TAX., 5124
Microspirobolus, TAX., 5124

RHINOCRICIDAE
Rhinocricus, TAX., 5124, 6829

TRIGONIULIDAE
Spirostrophus, TAX., 5124

SPIROSTREPTIDAE
MORPH., 16013
AETHIOPISTREPTUS, 8749
Attemostreptus, MORPH., TAX., 16013
Charactopygus, TAX., 6832

HARPAGOPHORIDAE
Thyropygus, TAX., 8749

EPINANNOLENIDAE
Epinannolene, TAX., 5124

INCERTAE SEDIS
(In Diplopoda)
Cubocricus, TAX., 5124
Cubodesmus, TAX., 5124
DARLINGTONIELLA, 5124
Plusioporus, TAX., 8749
Prostemmiulus, TAX., 5124

CHILOPODA

PHYL., 1694

HIMANTARIIDAE
Stigmatogaster, TAX., 6831

GEOPHILIDAE
Brachygeophilus, TAX., 5123
Gosiphilus, TAX., 5123
LEPTODAMPIUS, 5123
Meinertophilus, TAX., 6832

CHILENOPHILIDAE
Chilenophilus, TAX., 6831

LINOTAENIIDAE
Paraplanes, TAX., 6829
Scolioplanes, TAX., 6831

SCOLOPENDRIDAE
Scolopendra, TAX., 6829

LITHOBIIDAE
Lithobius, TAX., 6830, 6832

PTERYGOTERGIDAE
Pterygotergum, MORPH., 16012

ETHOPOLIDAE
Bothropolys, TAX., 6830
Polybothrus, MORPH., 16012

INCERTAE SEDIS
(In Chilopoda)
Newportia, TAX., 6831
Schizotergitius, MORPH., 16012

ONYCHOPHORA

(Vacant)

CRUSTACEA

DIST., TAX., (J) 15943; MORPH., 8063, 8064; PHYL., 12333; Entomostraca, DIST., 16016

BRANCHIOPODA

ANOSTRACA

CHIROCEPHALIDAE
Chirocephalus, DIST., TAX., 16016; MORPH., 1615

CLADOCERA

DIST., 12319A

CALYPTOMERA

CTENOPODA

SIDIDAE
Diaphanosoma, TAX., 12319A
Latonopsis, TAX., 12319A
Pseudosida, TAX., 12319A

ANOMOPODA

DAPHNIIDAE
Ceriodaphnia, TAX., 12319A
Daphnia, DIST., 12319A, 16016
Moina, TAX., 12319A

MACROTHRICIDAE
Macrothrix, TAX., 6834, 12319A

CHYDORIDAE
Alona, TAX., 12319A
Alonella, TAX., 12319A

GYMNOMERA

ONYCHOPODA

POLYPHEMIDAE
Bythotrephes, TAX., 10571

OSTRACODA

DIST., (Cb) 8680

PODOCOPA

CYPRIDAE
Candona, TAX., 6846, 8755
Chlamydotheca, DIST., 12320
Cypridopsis, DIST., 12320
Cypris, DIST., TAX., 16018
Heterocypris, DIST., TAX., 16018

CYTHERIDAE
Cytherideis, TAX., 6845
Cytheropteron, TAX., (E) 8758
Gomphocythere, DIST., TAX., 10569
Limnicythere, TAX., 10569
Microcytherura, TAX., 6845
ONYCHOCYTHERE, 17973
PSEUDOLIMNOCYTHERE, 6846

COPEPODA

TAX., 3499

EUCOPEPODA

CALANOIDA

DIAPTOMIDAE
TAX., 14235
Arctodiaptomus, TAX., 6841, 12324, 16016
Diaptomus, DIST., 16016; MORPH., 10568; TAX., 6842, 6844
Eudiaptomus, TAX., 6842
Hemidiaptomus, TAX., 6841, 8753
Pseudodiaptomus, TAX., 14235, 17969
PSEUDODIAPTALLOUS, N. SUBG., 17969
Sinodiaptomus, TAX., 6843
Thermocyclops, TAX., 6839, 12323A

HARPACTICOIDA

CANTHOCAMPTIDAE
Arcticocamptus, TAX., 8751
Attheyella, TAX., 8751
Leptopsyllus, TAX., 12331
Moraria, DIST., 17968
Paramesochra, TAX., 12331

CYLINDROPSYLLIDAE
Parastenocaris, TAX., 6836, 6840

LONGIPEDIIDAE
CHAPPUISIUS, 8754

THALESTRIDAE
Parathalestris, TAX., 6835

CYCLOPOIDA

CLAUSIIDAE
Mytilicola, DIST., MORPH., 16017; TAX., 3310

CYCLOPIDAE
Acanthocyclops, TAX., 6838
Diacyclops, L. H., 3202
Halicyclops, TAX., 8753
Macrocyclops, PHYL., 6837
Mesocyclops, TAX., 8753
Metacyclops, TAX., 6838
Speocyclops, TAX., 6838
Tropocyclops, TAX., 6844

CYCLOPINIDAE
TAX., 8757

NOTODELPHYOIDA

DOROPYGIDAE
Doropygus, TAX., 8752

CALIGOIDA

CALIGIDAE
Caligus, MORPH., 12332A

PENNELLIDAE
Pennella, DIST., 6795

LERNAEOPODOIDA

LERNAEOPODIDAE
Achtheres, DIST., L. H., 3396

SPHYRIIDAE
Sphyrion, DIST., TAX., 16019

BRACHIURA

ARGULOIDA

ARGULIDAE
Argulus, TAX., 16020

CIRRIPEDIA

THORACICA

BALANOMORPHA

BALANIDAE
Acasta, MORPH., 10572
Balanus, L. H., 10796; TAX., 14236

CHTHAMALIDAE
Chthamalus, L. H., 10796; MORPH., 10572

MALACOSTRACA

PERACARIDA

MYSIDACEA

DIST., 16022; TAX., 17972

ISOPODA

VALVIFERA

IDOTHEIDAE
Idotea, EMB., 9794; EMB., MORPH., 12323

ASELLOTA

ASELLIDAE
Asellus, EMB., 11470; HIST., 5126; TAX., 12329

EPICARIDEA

BOPYRIDAE
Pseudione, TAX., 12321

ONISCOIDEA

ONISCIDAE
Oniscus, HIST., 5126
Platyarthrus, HIST., 5126; TAX., 12336
Protracheoniscus, TAX., 8750

PORCELLIONIDAE
TAX., 8761
Metoponorthus, TAX., 8761
Porcellio, CYT., 52; EMB., 9783; HIST., 5126; MORPH., 1613; TAX., 8761

ARMADILLIDIDAE
Armadillidium, EMB., 9783
Troglarmadillidium, TAX., 12336

TRICHONISCIDAE
Androniscus, HIST., 5126; TAX., 10574
Cyphoniscellus, TAX., 12336
Haplophthalmus, HIST., 5126
Illyrionethes, TAX., 8760, 10574
Schoblia, TAX., 10575
Termitoniscus, TAX., 10575
Titanethes, HIST., 5126
TROGLOCYPHONISCUS, 12336

XIPHOSURA · EURYPTERIDA · ARACHNIDA · PYCNOGONIDA LINGUATULIDA · TARDIGRADA

INSECTA

SMINTHURIDAE
Arrhopalites, DIST., TAX., 3371
Sminthurides, TAX., 6943
DENISIELLA, N. SUBG., 6943

INCERTAE SEDIS
(In Collembola)
TASMANURA, 3371
Trogolaphysa, TAX., 14277

PROTURA

TAX., 14280

PALAEODICTYOPTERA

LITHONEURA, (Cb) 3372

PROTORTHOPTERA

ADELONEURIDAE, N. FAM., (Cb) 3372
ADELONEURA, (Cb) 3372

ORTHOPTERA

CYT., TAX., 6939

BLATTIDAE
PHYL., 1635
Blatta, L. H., 14276
Periplaneta, HIST., 4400; MORPH., 7935, 16965

MANTIDAE
Mantis, CYT., 61

ACRIDIDAE
Asmara, TAX., 3366
Atractomorpha, TAX., 3366
Chortoicetes, DIST., L. H., 15929
Chortophaga, CYT., 56, 8912
Dissosteira, L. H., 14122
Locusta, HIST., MORPH., 9786
Melanoplus, CYT., 5970; DIST., 1493, 1498; EMB., 13342, 17062, 17063; L. H., 14122
Parasphena, TAX., 3366
Pyrgomorpha, TAX., 3366
SUCCINOTETTIX, 6940

TETTIGONIIDAE
Tachycines, EMB., 768, 17975; L. H., 14114

GRYLLIDAE
Gryllotalpa, CYT., 7119
Gryllus, EMB., 17975; L. H., 5027
Oecanthus, CYT., 51

ISOPTERA

PHYL., 1635

KALOTERMITIDAE
Kalotermes, L. H., 14107

RHINOTERMITIDAE
Reticulitermes, L. H., 1636; TAX., (N) 3373

NEUROPTERA

PLANIPENNIA

CHRYSOPIDAE
Chrysopa, EMB., 17975

HEMEROBIIDAE
L. H., 10451

MANTISPIDAE
Anisoptera, TAX., 12409
PLATYMANTISPA, N. NAME, 12409

EPHEMERIDA

TAX., 12410
Iron, TAX., 12410
Oligoneuria, TAX., 6938

ODONATA

CYT., 14352; L. H., 1830
ARCHAEOPODAGRION, 16047
Cordulia, HIST., 2477
Enallagma, DIST., 3360
Epiophlebia, MORPH., 16045
Libellula, TAX., 12402
Macromia, DIST., 3360
Platycnemis, EMB., 17975

PLECOPTERA

Eusthenia, MORPH., 3362, 3363, 3364
Pteronarcys, EMB., 9793
Stenoperla, MORPH., 3363

CORRODENTIA

Copeognatha, TAX., Psocoidea, TAX., Psocoptera, TAX., 18039
Lachesilla, TAX., 12414
Trichadenotecnum, TAX., 12414

MALLOPHAGA

Heptapsogastridae, MORPH., TAX., 3369

PHILOPTERIDAE
BIZARRIFRONS, 8797
Degeeriella, TAX., 8797
Goniodes, TAX., 6941, 18038
Lipeurus, TAX., 6941
Nirmus, TAX., 8797
Philopterus, TAX., 8797
Strongylocotes, DIST., TAX., 3369

EMBIIDINA

DIST., PHYL., 6942
Metoligotoma, TAX., 6942
Oligotoma, TAX., 6942, 14278

THYSANOPTERA

TAX., 12415, 18033
Aelothrips, TAX., 5148
Frankliniella, DIST., TAX., 3367; L. H., 3367, 10409
Heliothrips, L. H., 8669
Herethrips, L. H., 12198
Neoheegeria, TAX., 18034
Scirtothrips, DIST., L. H., 17854
Scolothrips, DIST., L. H., 10446
Thrips, L. H., MORPH., 3181

ANOPLURA

HAEMATOMYZIDAE
Haematomyzus, TAX., 12416
Hoplopleura, DIST., L. H., 5231

HEMIPTERA

DIST., 10407; TAX., 1627, 8763

CORIXIDAE
CYT., 7122
Corixa, CYT., 1731
Cymatia, CYT., 1731
Graptocorixa, TAX., 16035
Micronecta, TAX., 3343, 12379, 12380
Sigara, CYT., 1731

NOTONECTIDAE
Anisops, TAX., 12380
Notonecta, EMB., 17975

NAUCORIDAE
Naucoris, MORPH., 10602

GERRIDAE
Potamobates, 16036

MIRIDAE
Horcias, DIST., TAX., 12190
Lygus, L. H., 12177, 15907
Psallus, L. H., 5029, 12230
Strongylocoris, TAX., 12378

ANTHOCORIDAE
Triphleps, DIST., TAX., 1627

CIMICIDAE
Cimex, L. H., 18012, 18013

NABIDAE
Nabis, EMB., HIST., 2476

REDUVIIDAE
TAX., 6909
Peregrinator, L. H., 10453
Rhinocoris, EMB., HIST., 2476

PHYMATIDAE
Phymata, L. H., 10601

PIESMATIDAE
Piesma, L. H., 8665

TINGITIDAE
Gargaphia, TAX., 12377
Leptodictya, TAX., 12377
Leptopharsa, TAX., 12377
Phatnoma, TAX., 12377

LYGAEIDAE
Eremocoris, CYT., 14353
Lygaeus, CYT., 14353; EMB., HIST., 2476
Macropterna, TAX., 14259
SINOSILLUS, 6913

ARADIDAE
Alydus, CYT., 5299

CORIZIDAE
Corizus, L. H., 12198

COREIDAE
Leptocoris, L. H., 1488
Pseudophloeus, TAX., 14259
Syromastes, EMB., HIST., 2476

PENTATOMIDAE
Murgantia, HIST., MORPH., 3342
Nezara, DIST., L. H., 5068
Solubea, DIST., L. H., 12185

HOMOPTERA

Jassoidea, PHYL., TAX., 18017; Bythoscopidae, TAX., 18017; **AGALLIIDAE**, **AUSTROAGALLOIDIDAE**, **IDIOCERIDAE**, **MACROPSIDAE**, **TARTESSIDAE**, and **THYMBRIDAE**, N. FAMS., 18017

FULGORIDAE
TAX., 3345, 8785
Amblycratus, TAX., 8785
Anotia, TAX., 8785
ATHESON, 8785
Bothriocera, TAX., 8785
CATONOIDES, 8785
Crepusia, TAX., 8785
Cyrpoptus, TAX., 8785
Delphax, TAX., 18014
Derbe, TAX., 8785
Enchophora, TAX., 6916
Euphanta, L. H., 14107
Euricania, L. H., 14107
FLATALOIDES, 8785
KARDOPOCEPHALUS, 8785
KOLOPTERA, 8785
Lappida, TAX., 8785
Liburnia, TAX., 18014
Megamelus, DIST., 3181, 3182
MELORMENIS, 8785
MESSOIDES, 8785
Monoflata, TAX., 8785
MUIRILIXIUS, 8785
MUIROLONIA, N. NAME, 8785
Mysidia, TAX., 8785
Neocenchrea, TAX., 8785
Olonia, TAX., 8785
Ormenis, TAX., 8785
Phrictus, TAX., 8785
Picumna, TAX., 8785
Pintalia, TAX., 8785
PLATONAX, 8785
Plectoderes, TAX., 8785
PSEUDOMYSIDIA, 8785
RHOTELLA, 8785
Syntames, TAX., 8785
Thionia, TAX., 8785
THIONIAMORPHA, 8785
THIONIELLA, 8785
THIONISSA, 8785
VANUOIDES, 8785
Vutina, TAX., 8785

CICADIDAE
Okanagana, DIST., 1628
Tibicen, L. H., 1628

CICADELLIDAE
TAX., 1629
Aceratagallia, L. H., 17880
BAKERIOLA, N. NAME, 18016
Chlorotettix, TAX., 1629
Cicadella, TAX., 18016
Deltocephalus, TAX., 16038, 18016
DIEMOIDES, 18016
Dikraneura, TAX., 1629
Empoasca, L. H., 12198; TAX., 10604, 18017, 18021
EUACANTHELLA, 18016
EUPRORA, 18016
Eutettix, DIST., L. H., 8645, 12186; TAX., 18016
Graphocephala, DIST., 17881
Hebecephalus, TAX., 16038
Hecalus, TAX., 18016
Ipocerus, TAX., 18016
Kana, TAX., 18016
Koebelia, TAX., 18017
Laevicephalus, TAX., 1629, 16038
Lonatura, TAX., 16037
Macropsis, DIST., L. H., 10390
Memnonia, TAX., 16038
Nirvana, TAX., 18016
Oliarus, TAX., 8785
Ophiuchus, TAX., 18016
ORIENTUS, 1629
Parabolocratus, TAX., 3346, 16038
Phlepsius, TAX., 1629
Phrynophyes, TAX., 18016
Reuteriella, TAX., 18016
TASMANOTETTIX, 18016
Thamnotettix, TAX., 18016
Xestocephalus, TAX., 18016

CERCOPIDAE
Lepyronia, TAX., 6916

MEMBRACIDAE
Stictocephala, L. H., 6915A

CHERMIDAE
Arytaina, TAX., 1631
LEVIDEA, 1631
Paratrioza, DIST., 10415; L. H., 8984
Psylla, TAX., 1631
Rhinopsylla, MORPH., 1631
Trioza, TAX., 1631

APHIDIDAE
EMB., 9789
Adelges, L. H., 3198
Amphorophora, L. H., 8638; TAX., 16039
Aphis, DIST., 1489; TAX., 3348
Dreyfusia, DIST., 14129; L. H., 1511, 14129
Eriosoma, L. H., 1492, 17855
Kakimia, TAX., 8786
Lachnus, L. H., 8648
Macrosiphium, DIST., L. H., 10451; EMB., 13349; HIST., 6918; TAX., 16039
Micromyzus, L. H., 12184
Mindarus, TAX., 18015
Rhopalosiphum, L. H., 3476, 17874

ALEYRODIDAE
Bakerius, TAX., 12381
Bemisia, L. H., 12198
Trialeurodes, TAX., 3344

COCCIDAE
TAX., 18019
ANNULASPIS, 10605
Antonina, DIST., 3186
Aonidomytilus, TAX., 10605
ASPIDASPIS, 10605
Aspidiotus, DIST., 17861; L. H., 8669, 17861
Asterolecanium, TAX., 14263
CHORTINASPIS, 10605
Chrysomphalus, TAX., 10605
Circulaspis, TAX., 10605
Clavaspis, TAX., 10605
Dactylaspis, TAX., 10605
Diaspidiotus, TAX., 10605
Epidiaspis, TAX., 10605
Eriococcus, TAX., 8784
Hemiberlesia, TAX., 6917, 10605
Laccifer, L. H., 14102
Lecanium, TAX., 3347
Lepidosaphes, L. H., 8983
LYRASPIS, 10605
Mesolecanium, DIST., 17859
NUCULASPIS, 10605
Quadraspidiotus, TAX., 10605
RADIASPIS, 10605
Rugaspidiotus, TAX., 10605

AMPHIBIA · REPTILIA

AMPHIBIA

(System of classification according to Noble, "The Biology of the Amphibia" (1931).)

REPTILIA

(Classification of fossils according to Zittel, "Textbook of Palaeontology," Vol. II (1932).)

Prosaurolophus, MORPH., TAX., 14291
Saurolophus, MORPH., TAX., 14291

PROTOCERATOPSIDAE
Leptoceratops, DIST., MORPH., (†) (K) 18052

CERATOPSIDAE
Brachyceratops, DIST., (K) 18052

NANOSAURIDAE
Nanosaurus, DIST., (J) 5165

AVES

CYT., 7113; DIST., 5180, 5189, 5206, 7025, 10639, 10645, 14293, 16082, 16086, 16087; L. H., 1643, 7025, 10639, 10642, 10645; MORPH., 1643, 7028, 7029, 9676, 11381, 14293, 15004, 15011, 18080; TAX., 5200, 10639, 10645, 12439, 16089, 18080

(Arrangement of orders and families according to Wetmore, "A Systematic Classification for the Birds of the World, Revised and Amended" (1934).)

STRUTHIONIFORMES

STRUTHIONIDAE
Struthio, MORPH., 7931

RHEIFORMES

RHEIDAE
Rhea, MORPH., 7931, 11390

CASUARIIFORMES

CASUARIIDAE
Casuarius, MORPH., 7931

SPHENISCIFORMES

SPHENISCIDAE
Eudyptes, DIST., L. H., MORPH., 10641; TAX., 7001

GAVIIFORMES

GAVIIDAE
Gavia, L. H., 9064

COLYMBIFORMES (PODICIPEDIFORMES)

COLYMBIDAE (PODICIPEDIDAE)
L. H., 8844
Colymbus, DIST., 8844; L. H., 8844, 9064
Podiceps, L. H., 5171

PROCELLARIIFORMES

Thalassidromidae, TAX., 5182

DIOMEDEIDAE
Diomedea, DIST., 10646; L. H., 9064, 10646; MORPH., 4369

PROCELLARIIDAE
Fulmarus, L. H., 18084
Pachyptila, MORPH., 5183
Petrodroma, DIST., 5188
Puffinus, DIST., 16090; EMB., 4384; L. H., 9064

HYDROBATIDAE
Oceanodroma, DIST., 5188

PELECANIFORMES

PHAETHONTIDAE
Phaethon, DIST., 7007

PELECANIDAE
Pelecanus, MORPH., 5196

SULIDAE
Sula, L. H., 163; L. H., 168, 169; TAX., 1651

PHARACROCORACIDAE
Phalacrocorax, L. H., 5201

ANHINGIDAE
Anhinga, DIST., TAX., 7022

CICONIIFORMES

ARDEIDAE
Ardea, DIST., 5191, 14296, 14305; HIST., 4359; L. H., 9064, 14305
Botaurus, L. H., 5179

THRESKIORNITHIDAE
Ajaia, L. H., 9064

ANSERIFORMES

L. H., 14301, 14302

ANATIDAE
L. H., 8841, 8844
Anser, L. H., 9064
Arctonetta, DIST., 1644
Branta, DIST., 16088; L. H., 9064
Cygnus, DIST., 16088; L. H., 9064; MORPH., 705
Mareca, L. H., 9064
Mergus, DIST., L. H., 5205
Nettion, L. H., 9064
Nyroca, DIST., 9068
Philacte, L. H., 9064
Querquedula, L. H., 10815
Somateria, L. H., 8844

FALCONIFORMES

ACCIPITRIDAE
Accipiter, DIST., 14296, 14306; TAX., 14306
Buteo, L. H., 9064, 14312
Circus, DIST., L. H., 14292
Haliaeetus, DIST., 8828; L. H., 9064
Rostrhamus, L. H., 9064
Urubitinga, L. H., 9064

FALCONIDAE
Falco, DIST., 8853, 14296; L. H., 9064
Herpetotheres, TAX., 1651

GALLIFORMES

DIST., L. H., TAX., 8851

MEGAPODIIDAE
Leipoa, L. H., 18071
Megapodius, TAX., 7014

CRACIDAE
Ortalis, L. H., 9064

TETRAONIDAE
Bonasa, L. H., 3539, 14435, 14436
Canachites, TAX., 16105
Centrocercus, L. H., 9067
Lagopus, DIST., TAX., 8851; L.H., 8838, 14299
Falcipennis, TAX., 16105

PHASIANIDAE
Afropavo, TAX., 6941
Colinus, L. H., 5230, 9064, 9066
Coturnix, DIST., 5186
Gallus, CYT., 7111; EMB., 699, 738, 4377, 4380, 5945, 5954, 5958, 7984, 8036, 8050, 8052, 9759, 9760, 9762, 9770, 11442, 11443, 13328, 13331, 13332, 15072, 15073, 15080, 17047, 17048; HIST., 656, 5885; MORPH., 757, 759, 5914, 7984, 16974
Lophophorus, TAX., 16077
METALLOPHASIS, N. SUBG., 16077
Lophortyx, L. H., 1878, 10818
Perdix, L. H., 164
Phasianus, L. H., 1879, 14436
Synoicus, DIST., 5186

GRUIFORMES

TURNICIDAE
Turnix, TAX., 7015

RALLIDAE
L. H., 8841
Amaurornis, DIST., MORPH., 7022
Coturnicops, DIST., 18059
Megacrex, DIST., TAX., 7022
Rallus, TAX., 7015

OTIDIDAE
Heterotetrax, DIST., TAX., 7023

CHARADRIIFORMES

JACANIDAE
Jacana, TAX., 1651

CHARADRIIDAE
Anarhynchus, DIST., L. H., 5192
Charadrius, TAX., 7015
Chettusia, DIST., L. H., 16073
Squatarola, DIST., L. H., 16073
Thinornis, DIST., 18060
Vanellus, L. H., 9064

SCOLOPACIDAE
L. H., 8841
Actitis, L. H., 10644
Capella, L. H., 10644, 16073
Numenius, DIST., L. H., 16073
Phaeopus, L. H., 9064
Tringa, DIST., 16073

LARIDAE
Chlidonias, DIST., 14300
Larus, EMB., 4383
Sterna, DIST., 8850; EMB., 4383; L. H., 5413, 8850, 14307; TAX., 7017

ALCIDAE
Aethia, L. H., 9064
Endomychura, DIST., TAX., 5176

COLUMBIFORMES

COLUMBIDAE
Columba, L. H., 9064
Ectopistes, L. H. 9064
Geopelia, DIST., TAX., 7022
Leptotila, L. H., 9064
Ptilinopus, DIST., TAX., 7022
Streptopelia, DIST., L. H., 8848

PSITTACIFORMES

PSITTACIDAE
Conuropsis, L. H., 9064
Purpureicephalus, DIST., MORPH., TAX., 5199
Rhynchopsitta, L. H., 9064

CUCULIFORMES

CUCULIDAE
L. H., 8841
Coccyzus, L. H., 9064
Cuculus, L. H., 9064

STRIGIFORMES

TYTONIDAE
Tyto, DIST., 14296

STRIGIDAE
Bubo, DIST., 8853
Cryptoglaux, L. H., 5198
Glaucidium, MORPH., 7035
Otus, DIST., 10651; TAX., 10651, 18061
Strix, DIST., 14296; L. H., 3536; MORPH., 4328

CAPRIMULGIFORMES

CAPRIMULGIDAE
Nyctidromus, L. H., 9064

MICROPODIFORMES

MICROPODIDAE
Apus, DIST., 14296

TROCHILIDAE
Cynanthus, L. H., 9064
Eugenes, L. H., 9064
Hylocharis, L. H., 9064
Lampornis, L. H., 9064
Selaphorus, L. H., 5193

TROGONIFORMES

TROGONIDAE
Pharomachrus, L. H., TAX., 16063
Trogon, L. H., 9064

CORACIIFORMES

ALCEDINIDAE
Alcedo, DIST., 14296
Ceryle, MORPH., 9775
Halcyon, TAX., 7013
Megaceryle, L. H., 170, 10652
Sauromarptis, DIST., TAX., 7022
Syma, DIST., TAX., 7022

PICIFORMES

CAPITONIDAE
Cyanops, DIST., TAX., 10638

PICIDAE
Campephilus, L. H., 9064, 12437
Ceophloeus, L. H., 12437
Dryobates, DIST., 7026, 8827; L. H., 7026, 12437; TAX., 8827
Sphyrapicus, L. H., 12437

PASSERIFORMES

TAX., 18065, 18073

TYRANNIDAE
Cnemotriccus, DIST., TAX., 7036
Empidonax, L. H., 9064
Mitrephanes, DIST., 7036
Myiarchus, DIST., TAX., 7036; L. H., 9064
Myiodynastes, L. H., 9064

MENURIDAE
Menura, L. H., TAX., 16084

ALAUDIDAE
Anacorys, DIST., TAX., 7023; L. H., 5197
Calendulauda, DIST., TAX., 7023
Chersomanes, DIST., TAX., 7023
Pseudammomanes, DIST., TAX., 7023

HIRUNDINIDAE
DIST., L. H., 8831
Hirundo, DIST., 5207, 8845, 14296; L. H., 18074; TAX., 8845
Petrochelidon, TAX., 1649

DICRURIDAE
Dicrurus, DIST., MORPH., 7022

CORVIDAE
Aphelocoma, TAX., 16100
Corvus, DIST., 14296
Garrulus, DIST., 14296
Pica, DIST., 8837, 14296; TAX., 8837
Xanthoura, L. H., 9064

PARADISEIDAE
Ailuroedus, DIST., L. H., 5185
Cicinnurus, L. H., 7022
Manucodia, L. H., 7022

PARIDAE
Parus, DIST., 14296
Psaltriparus, TAX., 1650

SITTIDAE
Sitta, L. H., 7021; TAX., 1642

TIMELIIDAE
Aethocichla, DIST., TAX., 7023
Crateroscelis, DIST., 7022
ELOCINCLA, 10647
Napothera, DIST., TAX., 10638
Psophodes, L. H., MORPH., 14298

PYCNONOTIDAE
Iole, DIST., TAX., 10647

TROGLODYTIDAE
Troglodytes, DIST., 14296

MAMMALIA

GEOGRAPHICAL INDEX

(For introductory guide see page 1813)

NORTH AMERICA

CANADA

GREAT LAKES

UNITED STATES

MEXICO

CENTRAL AMERICA

WEST INDIES

SOUTH AMERICA

EUROPE

AFRICA

ASIA

MALAY ARCHIPELAGO

AUSTRALASIA

AUSTRALIA

NEW ZEALAND

(Including Auckland, Campbell, Chatham and Kermadec Islands)

ANTARCTICA

(Including islands North to South Georgia and Macquarie Island)

OCEANIC ISLANDS

ATLANTIC ISLANDS

INDIAN OCEAN ISLANDS

(Including Kerguelen, Crozet and Prince Edward Islands, excluding Ceylon and Madagascar)

PACIFIC ISLANDS

OCEANS

GEOLOGICAL INDEX TO PALEONTOLOGICAL MATERIAL

(For introductory guide see page 1813)

PALEOZOIC

MESOZOIC

CENOZOIC

TERTIARY

QUATERNARY
(Including Pleistocene and post-Pleistocene)

SUBJECT INDEX

(For introductory guide see pages 1811-1812)

A

C

D

E

F

H

I

L

8

M

N

O

P

V

Y